The Electrical Industry's Weekly Magazine

January 30, 1956

Electrical World

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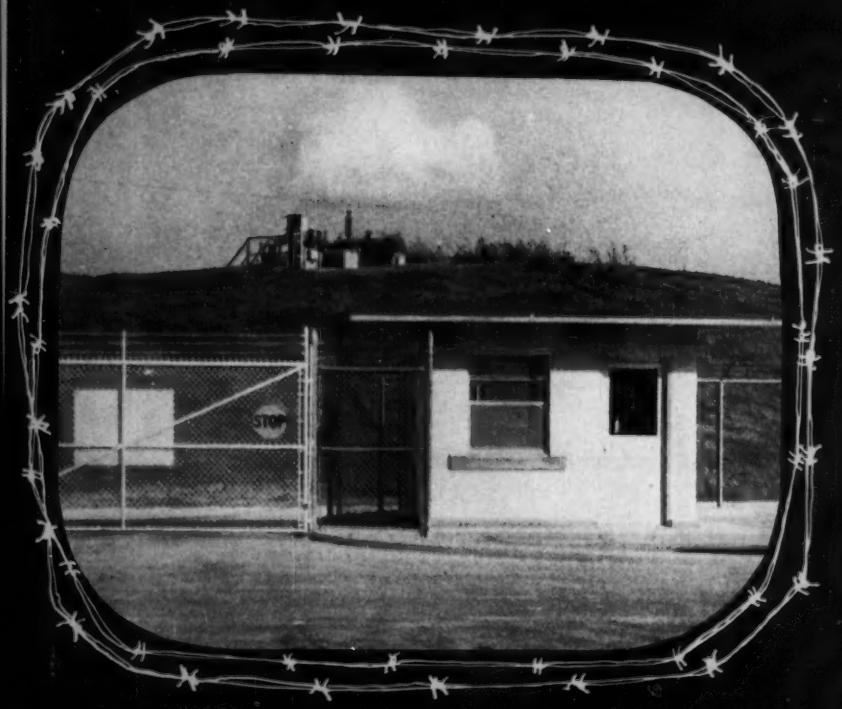

TV GUARDS POWER PLANT GATE...

PAGE 48

Contamination Dictates Substation Design . . . Page 16

BUSINESS OUTLOOK . . . Page 60

E B POWER
UNIVERSITY MICROFILMS IN
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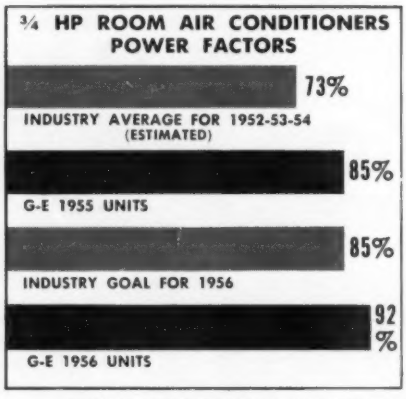
HIGHER POWER FACTORS on all 1956 G-E room air conditioners will more than meet industry goals, according to P. M. Augenstein (right), General Manager—Room Air Conditioner Department. Above, he reviews with G. T. Bogard, Manager—Utility Relations, Appliance and Television Receiver Division, the progress made towards helping utilities solve critical summer peak load conditions.

Hiking of room air conditioner PF standards touches off

New savings for distribution systems



90% OR BETTER PF of all 1956 G-E room air conditioners exceeds industry power factor goals. New recommendations are 75% for ⅓ HP, 80% for ½ HP, and 85% for ¾ HP and above.

Adoption of new power factor recommendations by room air conditioner manufacturers holds the promise of new system economies for many utilities. Effective January 1, 1956, the new standard accepted by **EEI** industries calls for a minimum power factor of 85% for 3/4 HP and 80% for 1/2 HP room air conditioners.

With two million room air conditioners forecast as industry's annual sales volume by '58, increased pf's can relieve many utilities of much unnecessary expense on their distribution systems. Low power factors, as a rule, leave utilities the unenviable choice between excessive capacitance expenditures and the even more costly process of raising system voltage levels. From a revenue standpoint, low power factors force utilities to provide more current without being paid for it.

Utilities are to be congratulated for their efforts towards stimulating interest in higher pf's which benefit both the utilities and the domestic users. Higher pf's mean fewer overloaded house circuits, less fuse failures, and greater unit efficiency because of the improved electrical designs.

At General Electric, work to help utilities realize appreciable distribution system economies has resulted in the fact that G-E room air conditioners during 1955 and again in 1956 met and exceeded the industry goals—goals which were not to be effective until this year. And such work will continue in order to help utilities meet their growing loads at the lowest possible cost. General Electric Company, Schenectady 5, N. Y. 301-309

MORE POWER TO AMERICA

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

VOL 145 No 5 January 30, 1956

MANAGEMENT

TV GUARDS POWER PLANT GATE..... 48
Industrial Relations 50
Business Outlook 60
Finance and Regulation..... 63
Statistics 66

DISTRIBUTION

CONVERSION BOOSTS SYSTEM CAPACITY.....C. E. Nelson 24
COMBINATION SWITCHING FITS VAR LOAD.....A. R. Milliken 43

SUBSTATIONS

CONTAMINATION DICTATES DESIGN.....J. R. Dickey 16

SALES

CAN APPLIANCE SALES KEEP IT UP?..... 31
ANOTHER JOB FOR ELECTRICITY: COOLING CORN.....Bruce Fearn 55

MEETING

NORTHEASTERN WEED CONTROL CONFERENCE..... 20

EDITORIAL AND COMMENTARY

Editorials 5
In the Industry..... 62
Technical Notes 62

INDUSTRY NEWS

Electrical Week 6
Current Events.....8, 15, 26, 32
News About People..... 36
Meetings Calendar 40
Manufacturers and Markets... 56

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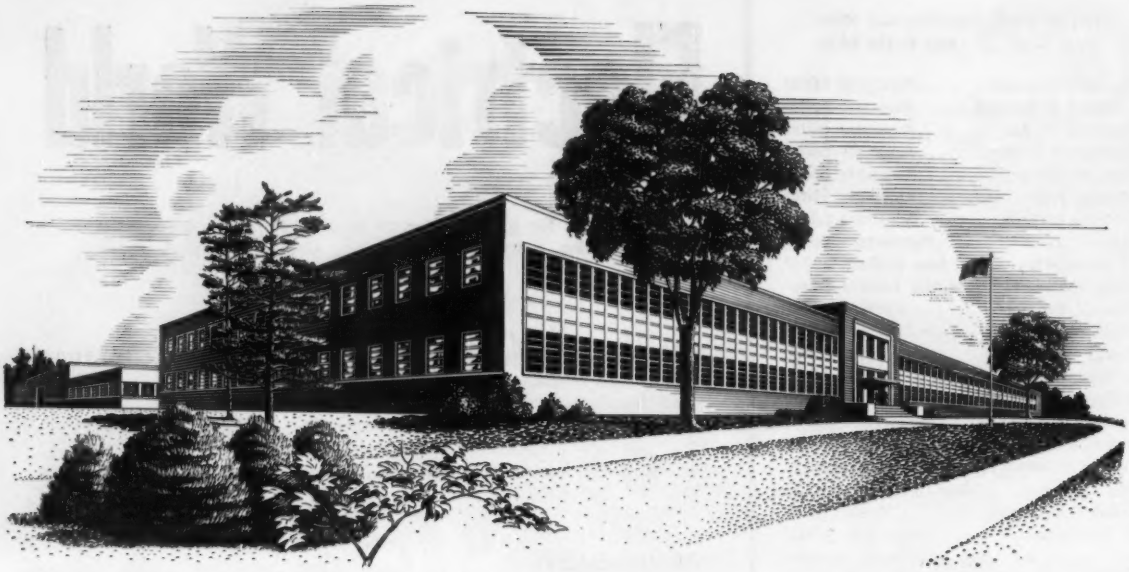
COMING NEXT WEEK—Companies building 330-kv lines are profiting from experience. Transmission engineers especially will be interested in learning how this new knowledge is being applied.



COMBUSTION ENGINEERING now building

NUCLEAR ENGINEERING AND DEVELOPMENT CENTER

On a 530-acre site in Windsor, Connecticut, Combustion Engineering is now building a Nuclear Engineering and Development Center. In addition to the Engineering and Administration Building, shown above, there will be a critical experiment facility for studying the physics and nuclear characteristics of reactor cores, a "hot" laboratory and a fuel element fabrication plant, together with related metallurgical, chemical and physical testing laboratories.

This multi-million dollar project, for which Stone & Webster Engineering Corporation are the architects and engineers, is scheduled for initial operation late this year and completion in early '57. In conjunction with new nuclear facilities recently placed in operation at the Company's Chattanooga, Tenn., plant, the Windsor plant will enable Combustion

to design, develop and manufacture complete nuclear power reactor systems

Heavy components such as reactor vessels, boilers, plugs and shields will be manufactured at Chattanooga. Reactor cores, including fuel elements and control rods, will be produced at Windsor.

The new nuclear building at Chattanooga includes such equipment as a 15,000,000-volt betatron for fast X-raying of thick plate and welds; large precision machine tools capable of handling work up to 20 feet in diameter with accuracies comparable to those required in watchmaking; and cranes to handle loads in excess of 300 tons. A new dock is equipped to handle reactor vessels too large and heavy for rail or highway shipment. By virtue of these facilities, Combustion becomes the *first company in the world* to possess equipment especially designed for the manufacture of heavy reactor components and to be able to ship them by water to virtually all river and coastal ports.

The panel at the right reveals the Company's current activity in the nuclear field. With the new facilities now available or in process, and others recently authorized, Combustion is prepared to achieve the same position of leadership in nuclear power that it has long occupied in the field of conventional power generation.

C-E NUCLEAR WORK 1955-56

Contract to design, develop and build complete nuclear reactor system for a submarine. *(This contract made Combustion the country's third major contractor to AEC on the naval reactor development program, and the first to undertake such a contract with its own facilities.)*

Contract to design and build major reactor components for U.S.S. Seawolf.

Contract to design and build major reactor components for large naval surface ship.

Contract to design and build major reactor components for Submarine Advanced Reactor and Submarine Fleet Reactor Systems.

Contract to design and build major reactor components for Shippingport plant to be operated by Duquesne Light Company. *(This will be country's first commercial size nuclear power plant.)*

Contract to design and build major reactor components for Atomic Power Development Associates. *(This fast breeder reactor, to be operated by Detroit Edison Company, is regarded as the most advanced type projected to date for a commercial size power installation.)*

Agreement with AEC for design and evaluation studies of both large and small reactors and of fuel elements and their fabrication.

COMBUSTION ENGINEERING

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

E-595

C-E

STEAM GENERATING UNITS; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; DOMESTIC WATER HEATERS; SOIL PIPE

EDITORIALS

Live Better . . . Electrically

For utility men in search of a comprehensive, all-industry promotion program to step up residential use of electricity, the "Live Better . . . Electrically" campaign is a natural. Some 70 electric utilities have already joined in the effort, which was first proposed to the industry last fall by Roy W. Johnson, executive vice president, General Electric Co.

Kickoff will come Feb. 8 with a closed-circuit telecast beamed to utility supporters and their allies in the effort to make the public more aware of the advantages and convenience of electrical living. Officers of organizations which have a direct stake in the campaign and representatives of leading trade and business publications will take part in the kickoff program, (EW, Jan. 2, p 8).

While the campaign is aimed at the general public, an important first step is organizing the utilities and their trade allies into an effective, coordinated campaigning group. Harllee Branch, Jr, president, Edison Electric Institute, makes the point that the success of the overall program hinges largely on the extent of local cooperative action by utilities and their trade associates.

The "Live Better . . . Electrically" program has much in common with other national efforts to improve and modernize residential dwellings and to raise generally the living conditions of present day Americans. The aim to provide better living is shared by such efforts as ACTION (American Council To Improve Our Neighborhoods) and Operation Home Improvement (EW, Jan. 9, p 75). "Live Better . . . Electrically" is the utility counterpart to these campaigns.

But the electrical promotion program goes further, for it is directed toward every segment of the public. Through all media from press releases to television spectaculars the program offers bright promise of making the public more aware of the vast contribution that electrical appliances and equipment make to the American standard of living.

. . . With Plenty of "Housepower"

Formal announcement of Edison Electric Institute's "Housepower" program (EW, Jan. 16, p 10) puts the nation's electric companies in the forefront of the campaign for better home wiring.

The "Housepower" program, as envisioned, should help to accomplish these two things:

1. Dramatize to the consumer the high price he is paying in terms of convenience, comfort, and safety for his outmoded wiring.

2. Supply a new and broad wiring promotional base in which not just the utilities but the whole industry can participate.

In practice, the "Housepower" program should prove to be an appropriate complement to any utility load building effort, be it "Live Better . . . Electrically," EEI's coordinated campaigns, or whatever.

Similarly, the "Housepower" theme, rather than conflict, can complement the older, established terms of the trade such as "Adequate Wiring." Some advertisers already are planning to tie the two terms together in their copy. Example: "You have low Housepower if your TV set flickers—it means your wiring is not adequate for today's needs." The National Adequate Wiring Bureau, too, will use "Housepower" in its advertising.

"Housepower" may be just the kind of catch word the industry needs to give the wiring story a popular appeal. We talk about horsepower, why not "Housepower."

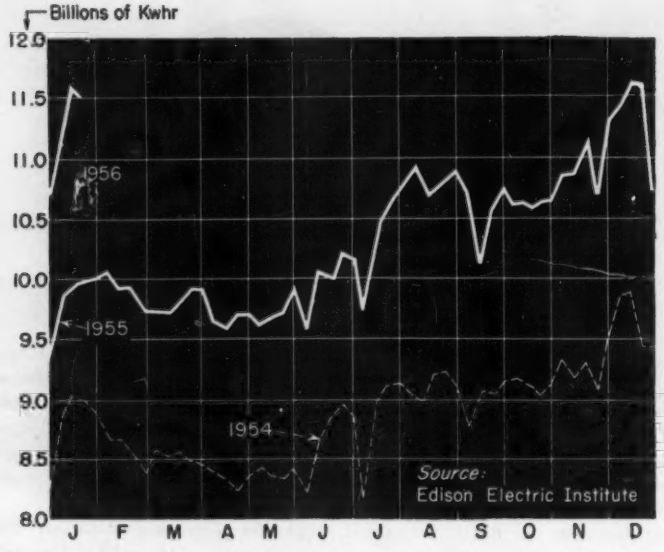
Individually many utilities have made long strides in promoting and offering every encouragement to more adequate home wiring. Through financial plans, advertisements, and many kinds of promotional material, they have shown their keen interest in the problem and their willingness to do something about it.

The "Housepower" campaign now offers national backing for these local efforts. It is a welcome and worthwhile addition and should offer an excellent stimulant to the other efforts. But it is clear to all that it cannot and does not propose to replace these local efforts. In fact its biggest contribution may be to coordinate and spur them toward greater effectiveness.

Utilities have committed themselves to a sizable investment in the national "Housepower" program. Only through follow-up will they assure themselves of getting the most mileage for their money.

ELECTRICAL WEEK

LAST MINUTE



OUTPUT

Week Ended Jan. 21
11,521,000,000 Kwhr
Up 15.4%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 10.7%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Jan. 21	+15.4	+11.2	+9.1	+23.6	+11.2	+16.1	+13.2	+12.6	+14.9	+10.6
Jan. 14	+16.8	+13.3	+11.2	+25.4	+10.6	+18.8	+12.6	+11.7	+15.9	+9.5
Jan. 7	+12.4	+7.3	+4.9	+18.7	+5.8	+18.2	+8.3	+8.4	+15.8	+4.1

Seasonally Adjusted Index 212.5 Week Ago 213.2 Year Ago 183.9

Issue's Highlights—New Vermont utility is proposed by Central Vermont Public Service Co's Pres A. A. Cree to distribute 100,000 kw of St. Lawrence power allocated to state . . . First fully integrated aluminum operation is planned by three-company team: Olin Mathieson Chemical Corp, American Gas & Electric Co, and Pittsburgh Consolidation Coal. Costing about $170 million initially, the Ohio River Valley project will utilize molten char as fuel . . . Westinghouse Electric reports $1,307,000 loss during 1955's fourth quarter as shipments dropped 27% from previous year's last quarter.

The "Outstanding Young Electrical Engineer" award presented each year by Eta Kappa Nu goes this year tc W. E. Chope, president of Industrial Nucleonics. Receiving honorable mention are: J. N. Grace, Westinghouse; H. R. Johnson, Hughes Research; D. B. Shuster, Sandia Corp; and Glen Wade, Stanford University.

At AIEE Winter General Meeting in New York this week, Eta Kappa Nu, honorary electrical engineering society will induct as "eminent members:" W. D. Coolidge, x-ray consultant and former vice president of General Electric; L. N. Brillouin, director of electronic education, IBM; and Harry Nyquist, assistant director of system study, Bell Telephone Laboratories.

Recent Labor Settlements—Consolidated Edison of New York, UWUA, and IBEW agree to a package increase of 25¢ an hour. Included is a wage increase of 10¢ an hour, retroactive to Jan. 1, and a 3% wage increase in two steps in 1957. Also included is 5¢ an hour increase for all employees completing 25 years of service during the extended contract term . . . Narragansett Electric and Brotherhood of Utility Workers of New England agree to 9% wage increase of which 3% is retroactive to Aug. 1, 1955, 3% took effect Jan. 1, and 3% will become effective Jan. 1, 1957 . . . Duke Power and IBEW agree to wage increase ranging from 4¢ to 12¢ an hour.

Ford Eyes Hotpoint—Ford interests are looking into the possible purchase of Hotpoint Co, Wall Street sources say.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire—House Interior Committee approved $156 million Fryingpan-Arkansas multipurpose project, voting for amendments which made it conform to the version already approved by Senate committee.

NRECA Meeting—Predicting threefold increase in farm power consumption in next 20 years, REA Administrator Ancher Nelson told nearly 5,000 delegates at NRECA annual meeting in St. Louis, there would be need for about $6 billion in new generating, transmission, and distribution facilities. That is, co-ops would need about twice as much capital in next 20 years as they have had in first 20 years, he said.

Arkansas's ex-Gov Sidney McMath accused electric companies of being in politics 24 hours each day. "If political activities of private companies were not checked," he continued, they will "attain their ultimate goal which is complete control of generation, transmission, and distribution of electric power in America."

Rep Robert E. Jones (D-Ala.) believed power issue was not one of private versus public power but rather one of supplying low cost energy from either source. "I believe," he said, "that if private power companies can ever prove it is feasible for them to produce and distribute an abundance of low-cost energy and have it available when and where it is needed, then the field is open to them."

Sen Alexander Wiley (R-Wis.) warned against trying to "mutilate American co-ops" by punitive tax laws but said all segments of American society should carry a fair share of tax burden."

NRECA Pres J. E. Smith cautioned that REA power estimates are too conservative. "I think," he said, "that all are in danger of being so conservative that we are not on solid ground." (For remarks by Clyde T. Ellis see below).

Westinghouse Strike—Negotiations were recessed for Westinghouse directors' meeting as EW went to press. Westinghouse Pres Price claims that recent negotiations show more promise. But IUE Pres Carey protests that they show very little collective bargaining, endorses proposal of National Citizens' Committee Chairman John Carmody to intervene. Meanwhile back-to-work movement of IUE members pushes 27%. Independent organizations challenge IUE representation at seven plants and UE at an eighth while IBEW proposes to represent 537 UE members at Sunnyvale, Calif.

ABOUT PEOPLE IN THE INDUSTRY

Co-ops will have to more than double their system investment before another 20 years have passed, Clyde T. Ellis, NRECA general manager, told annual meeting in St. Louis. "This means continued borrowing from REA, for we are convinced the minute we must go to the money market for expansion funds . . . we are sunk. We are also convinced that the monopoly boys who dictated the Hoover Commission's lending agency recommendations mean business. They mean to brand us un-American, kick us out of the REA-type partnership, slam the door, and go buy some more yachts."

All Federal water projects, including power, are subsidized, more or less, "producing an imbalance in a free market economy," and a "major overhaul of existing procedures" is needed to bring about sound, consistent Federal policies, asserted Admiral Ben Moreell, chairman of Task Force on Water Resources and Power of Second Hoover Commission. He said a Task Force aim is "to define a consistent Federal policy (so that) centralization of authority in government (is) lessened, local authority strengthened, and competition with private enterprise eliminated."

More News About People page 36

Cree Proposes New Vermont Utility

- **Central Vermont PS Corp president petitions Public Service Commission**
- **Purpose will be to distribute 100,000 kw St. Lawrence power in state**
- **Support of other utilities invited; network analyzer studies arranged**

Central Vermont Public Service Corp has filed a petition with the Public Service Commission of Vermont requesting permission to establish a new corporation to aid in transmission of Vermont's 100,000-kw allocation of St. Lawrence River power. The new utility would be called Vermont Electric Power Co, Inc.

The petition was presented by Albert A. Cree, president of the sponsoring utility, at a recent meeting on St. Lawrence power at the State House in Montpelier, Vt.

Asks Utilities' Cooperation

Green Mountain Power Corp, Citizens Utilities Co, and other public utilities in the state were invited by Cree to cooperate in the venture. These sponsoring utilities, according to the petition, would provide the equity capital for the new corporation, and other capital required would be secured by borrowings on long term.

"Our ideas", said Cree, "are that this new Vermont Electric Power Co, Inc, will be the best vehicle for the most economical and most efficient construction, financing, ownership, and operation of such new overall transmission facilities as may be required to receive and transmit St. Lawrence power to electric distribution companies, cooperative, municipal, and investor-owned, for equitable distribution throughout the State."

"We believe, too," he continued, "that such a corporation would provide a convenient vehicle from the regulatory standpoint for the determination of costs properly allocable to such transmission."

Conducts Distribution Studies

Since the company learned last March of the state's tentative allocation of 100,000 kw of St. Lawrence power, it has been studying problems of reception and distribution of the power. Cree pointed out that the allocation was about two-thirds of present state requirements, and would be "equal to about half of such requirements in 1960, depending on what estimated rate of load growth between now and then is used."

ALBERT A. CREE

The studies indicated that because power from the St. Lawrence is expected to be delivered at three points on the western Vermont-New York State border, a shift of the principal state-wide power supply sources from the eastern and southern borders of Vermont to the western border may be necessary.

Plans Transmission Grid

To accomplish this, the utility suggested construction of a new 115,000-v transmission grid which would be added to present facilities "to provide for the equitable distribution of St. Lawrence power throughout Vermont."

In order to solve engineering problems involved in the studies, Central Vermont PS, in cooperation with Green Mountain and Citizens Utilities, has reserved the use of a network analyzer from General Electric Co.

Also at the State House hearing was Green Mountain Pres Glen M. McKibben, who said that the utility "has participated with some of the active public utilities of the state in the consideration of an appropriate entity to carry out the purpose of the law. It is our intention to continue such consideration and to actively cooperate in this purpose."

John Gibbs, vice president of Citizens Public Utilities, said the proposed sponsorship of Vermont Electric Power Co, Inc, has also been under consideration by the utility, and will be continued by CPU.

Lists Purposes of Utility

Purposes of the new utility, as stated in the proposed Articles of Association attached to the petition are:

1. "Constructing, purchasing, leasing, owning, and maintaining and operating properties for the generation, transmission, and sale of electrical energy to public utilities, including cooperative corporations and municipalities, in the State of Vermont and elsewhere.

2. "Constructing, purchasing, owning, leasing, operating, and maintaining such electric transmission system and facilities (necessary to receive delivery of electrical energy procured by Vermont through the PSC or other state agents from sources outside the state) and to transmit and deliver such energy in such amounts as are determined (by the PSC or other state agents to the) electric distribution companies, cooperative, municipal, and privately owned, for distribution in the State of Vermont."

New York City financial consultant Walter Von Tresckow, who figured in plans for the City of Memphis' municipal plant project, had previously, as head of Vermont Generating Station, Inc, submitted informally to PSC a proposal to erect necessary transmission facilities within Vermont.

Index on the Way

Electrical World's semi-annual index for July-December 1955 will be included with one of the February issues rather than a January issue as previously stated.

3 Companies Plan Fully Integrated Aluminum Project

The Team:

- **Olin Mathieson Chemical Corp**
- **American Gas & Electric Co**
- **Pittsburgh Consolidation Coal Co**

Total Investment: $170 million plus
Fuel: Char, economical coal product
Site: Ohio River Valley (see map)

Armed with plans for reportedly the world's first fully integrated aluminum plant, Olin Mathieson Chemical Corp last week prepared to make its first plunge into the aluminum industry.

To swing its Ohio River Valley project, requiring an initial $120-million investment from the chemical company, Olin Mathieson has teamed up with American Gas & Electric Co and Pittsburgh Consolidation Coal Co. The new operation represents another milestone in the trend of the aluminum industry to switch from hydro to coal.

Olin Mathieson's investment includes about $90 million for an alumina plant, a reduction plant, and a rolling mill. For its share of power facilities, the company will spend an additional $30 million. Capacity of the aluminum facilities, located near Clarington, Ohio, will be 230,000 tons of alumina and 60,000 tons of aluminum per year.

AG&E to Build Power Plant

The power plant, to be engineered and built by American G&E, will be constructed at a new major coal mine which will be owned and operated by Pittsburgh Consolidation Coal. Located slightly upstream on the West Virginia side of the Ohio at Cresap Bottom, the power plant will be connected to the aluminum facilities by a high tension transmission line.

The 450-Mw power plant, to be known as the Kammer Plant in honor of H. A. Kammer, executive vice president of AG&E Service Corp in charge of engineering and construction, will cost about $60 million.

One of the plant's 225-Mw units will be owned by Ohio Power Co, an AG&E subsidiary. The other will be owned by a joint subsidiary of Olin Mathieson and the coal company. Both units, however, will be operated by Ohio Power and integrated into the AG&E system.

Plant to Use Char, Coal

The Kammer Plant will utilize char as fuel, the first such application of this type of processed coal in the electric utility industry. Char for the plant's two boiler furnaces will be delivered directly from the coal company's carbonization plant at about 270F. The boilers will be designed also to burn coal delivered from the mine by conveyors, either as 100% coal or mixed in any proportion with char.

Char is the production of coal distillation in a plant which applies—to commercial operation for the first time—processes developed by Pittsburgh Consolidation's extensive coal research. By-products such as tar-acids, natural oils, carbon black, and electrode carbons, all salable to other industries, help to cut cost of power plant fuel. Investment in the coal reduction plant and the new mine to supply the coal will reach $20 million.

Coal reserves in the new project area have been estimated at more than 300 million tons. Annual requirements for initial operation will be about 2-million tons, leaving ample reserves for expanded Olin Mathieson operations and other new industries.

Philip Sporn, president of AG&E, hailed the new project as a nationally significant development in the economics of aluminum reduction.

"This project," he said, "points up that a combination of (1) economically mined and advantageously located coal and (2) modern power generation technologies can be brought together in the Ohio Valley so that its power costs are low enough to make possible sound, economical, integrated aluminum operations competitive with existing operations located at centers more remote from markets."

Site Selection Factors Named

Selection of sites for the aluminum and power facilities resulted after consideration of the following factors:

1. Adjacent large high quality coal deposits.

2. Proximity to geographical center of fabricated aluminum market.

3. Location on deep water transportation.

4. Accessibility by rail from east coast ports.

5. Easy shipment of alumina and aluminum out as well as receipt of bauxite at plant site.

6. Sufficient acreage to permit substantial future expansion.

"There is every reason to believe,"

(*Continued on page* 10)

Westinghouse Reports Loss

. . . but fourth quarter shipments for 1955 drop only 27% from previous year's last quarter despite strike since October

Saddled with a company-wide strike since October, Westinghouse Electric Corp reported that losses in the fourth quarter of 1955 amounted to $1,037,000 or 9¢ a share.

Fourth quarter sales totaled $306,546,000. These, Westinghouse Pres Gwilym Price stated, were derived from 58 plants which remained unaffected by the strike, from struck plants where 5,000 employees crossed picket lines to return to work, and from subsidiaries. In the final quarter of 1954 net sales were $422,801,000.

Net income for all of 1955 was $42,803,000 or $2.46 a common share. This was about half the $79,922,000 cleared ($4.78 a common share) in 1954.

In the first nine months last year, however, the company showed a net income of $43,839,000, or $2.55 a common share, on net sales of $1,134,431,000. Losses in the last quarter due to the strike slashed profits for the entire year.

Last October the International Union of Electrical Workers called a strike at 30 Westinghouse plants and the independent United Electrical Workers called a strike at ten plants. More than 65,000 workers obeyed the calls. Major issue of dispute, Westinghouse states, has been the company's request for a five-year contract similar to that which IUE signed with General Electric Co last August.

Westinghouse plants which operated throughout the strike are listed as follows: Air-Arm—Baltimore; Air Conditioning—Staunton, Va.; Atomic Equipment—Cheswick, Pa.; Atomic Power—Bettis and Large, Pa.; Aviation Gas Turbine—Kansas City, Mo; Electronic Tube—Elmira and Bath, N. Y.; Industrial Heating—Meadville, Pa.; Lamp—Owensboro and Richmond, Ky., Reform, Ala., Paris, Tex., and Little Rock, Ark.; Lighting—Vicksburg, Miss.; Materials Manufacturing—Blairsville, Pa.; Meter—Raleigh, N. C.; Welding—Montevallo, Ala.; Micarta—Hampton, S. C.; Mica—Irwin, Pa.; Motor—Bellefontaine and Upper Sandusky, Ohio; Standard Control—Beaver, Pa.; Sturtevant—Hyde Park, Mass.; Pacific Coast Manufacturing—Sunnyvale, Calif.; and 28 of 41 manufacturing and repair plants.

Other plants were struck but continued reduced operations.

NEWS BRIEFS

Tightening copper supplies for this quarter seem imminent because of recent strike at Phelps Dodge Copper Products Corp refinery, Laurel Hill, Long Island City, N. Y., and strikes in Chile. Loss of 5,000 to 6,000 tons at the Phelps Dodge plant and 31,000 tons in Chile is not seen as critical, however, due to "comfortable" inventory positions of a number of major consumers.

American industry's loss from absenteeism each year has been estimated to be at least $5 billion by the Research Council for Economic Security, with illness alone resulting in the loss of services and production of one million workers. Council reports that "if all data were available, the loss from absenteeism might be . . . as much as $10 billion."

Fly ash from Niagara Mohawk Power Corp's Huntley steam station will be put to work soon by a new Buffalo corporation, Poz-O-Pac Corp. The firm, under a license from Atlas Fly Ash, Inc, will use a combination of fly ash, lime, and other materials for building road shoulders, road bases, parking lots, and other projects requiring hard surface. Stacks at Huntley have been equipped to catch the fly ash.

Sole power supplier for Othello, Wash., continues to be Washington Water Power Co for the City Council recently killed an ordinance which would have granted Big Bend Electric Cooperative, Inc, the right to become a supplier there. The Council decided last month to grant a franchise to the REA group but second reading of ordinance on Jan. 10 developed a 2-2 deadlock, killing the measure.

Drought and increased demand has caused Tennessee Valley Authority to cut power to about six major chemical and metal plants with which it has interruptible contracts. They include Aluminum Co of America, National Carbide Division of Air Reduction Corp, Pittsburgh Metallurgical Corp, and Monsanto Chemical Corp. Curtailments will not affect Atomic Energy Commission at Oak Ridge and Paducah or average customers.

Aluminum Project

(*Continued from page* 9)

Sporn declared, "that the Olin Mathieson project will be followed by still further developments in the Ohio Valley in aluminum and other chemical, electrochemical, and electrometalurgical operations which require large quantities of economical power.

"The (power) plant's significance lies in its potential expansion. Such expansion not only would meet the demand for additional power resulting from future growth of the Olin Mathieson aluminum operation but also would furnish the power for a good many satellite industries as well as for those wholly unconnected with aluminum but which also require tremendous blocks of highly economical power."

Sporn also pointed out that the "significance (of the project's carbonization plant) lies in the upgrading of coal into the chemical field while providing at the same time a source of lower cost fuel for electric power generation."

The plants included in the project are being built under certificates of necessity from the U. S. government issued in order to help increase the supply of primary aluminum.

The Olin Mathieson venture is the second major aluminum load obtained by the AG&E system in recent weeks. Last month, plans were announced for Ohio Power to supply power for a $120-million aluminum reduction plant to be built by Kaiser Aluminum & Chemical Corp at Ravenswood, W. Va. (EW, Dec. 12, p 88).

JUST USE OUR WAREHOUSE AS YOUR OWN. THIS REDUCES YOUR INVENTORY COSTS AND YOU CAN USE THE EXTRA ROOM.
THAT'S FINE! BUT CAN YOU FILL ALL OUR ORDERS PROMPTLY?

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Corpus Christi Hardware Co., Inc.
Crescent Electric Supply Co.
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Eoff Electric Co.
Evans Electrical Supply, Inc.
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Florida Electric Supply, Inc.
Heider Electric Supply
Hampden Electric Supply Co.
Hunzicker Brothers
Interstate Electric Co. of Shreveport, Inc.
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Wells Electric Supply Co., Inc.

GET IN TOUCH with your nearest Kaiser Aluminum Distributor *now!* Refer to the list at the left and your local telephone directory. Kaiser Aluminum and Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, Calif.

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A-4692

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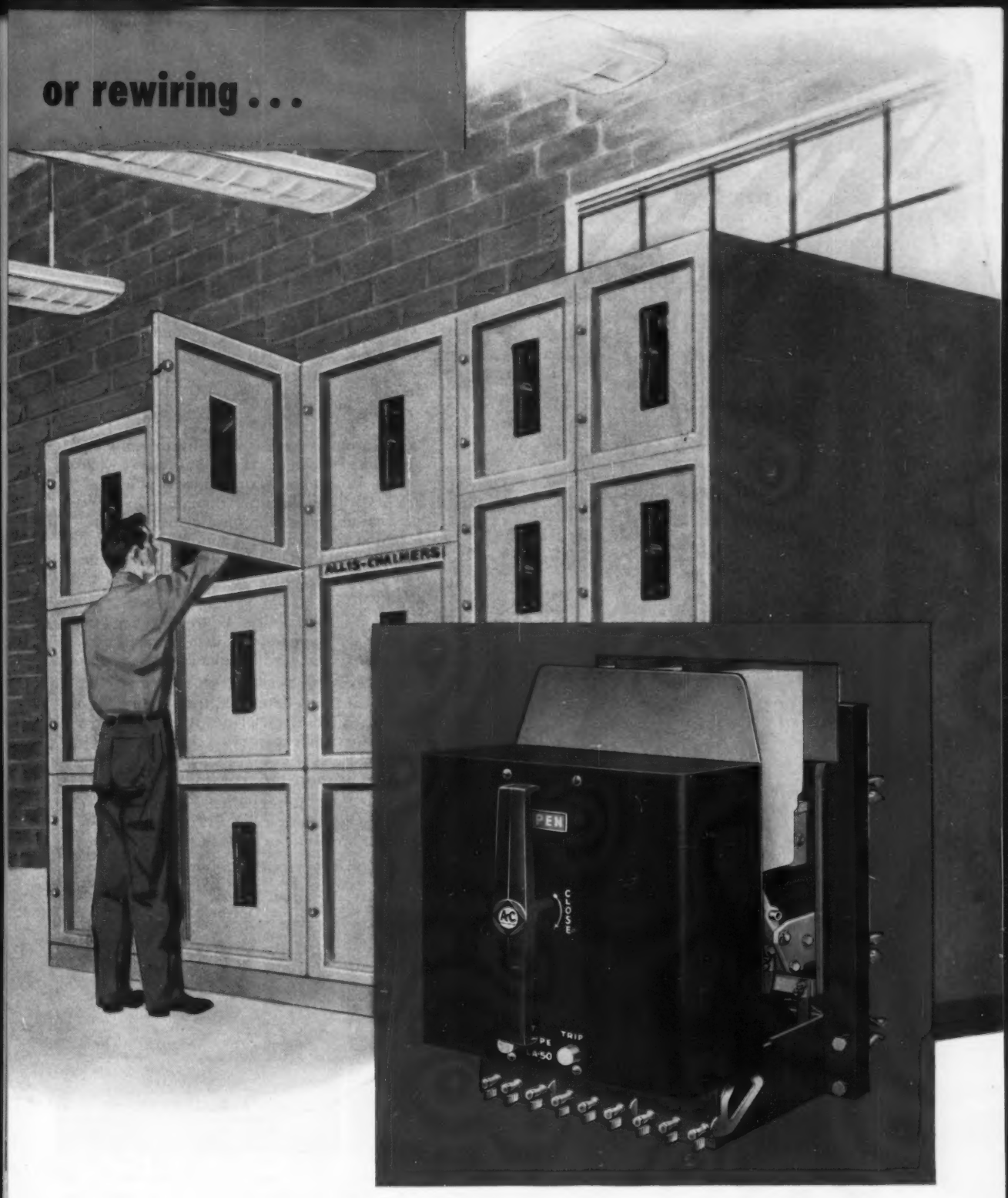
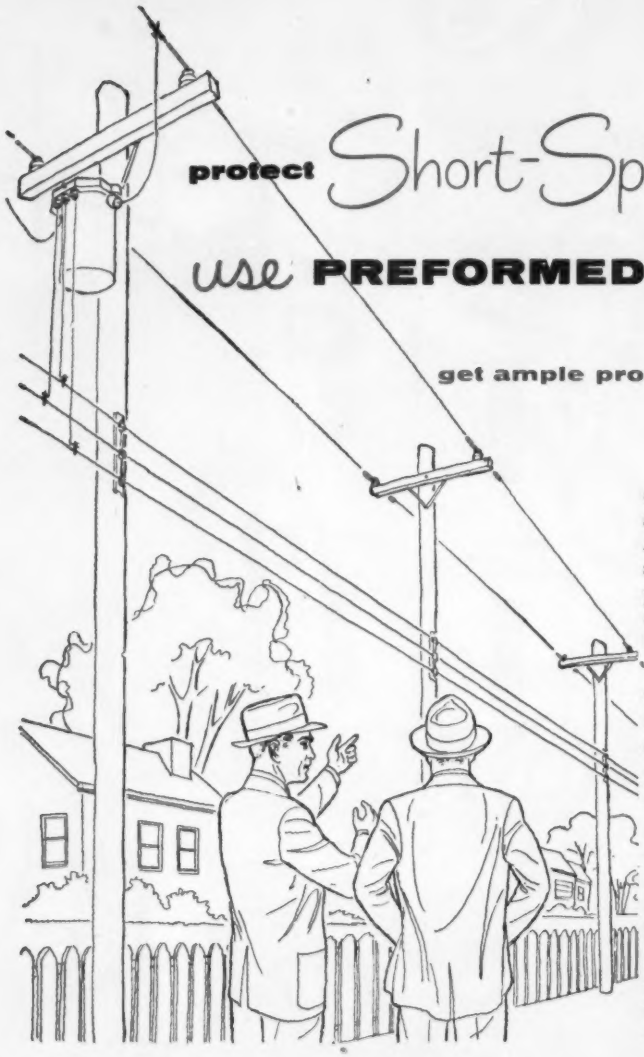


CHALMERS



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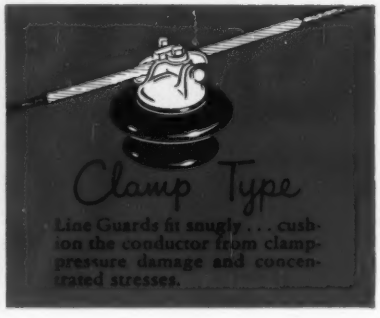

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Cowlitz Dam Illegal

. . . rules Superior court judge because Tacoma's $138-million project hinders navigation

Hydro development of the Cowlitz River by the City of Tacoma, Wash., suffered a legal setback recently when Superior Court Judge Charles T. Wright at Olympia, Wash., announced he would grant injunction prohibiting further city expenditures on the $138-million project.

Judge Wright, in arriving at his decision, pointed to a 1909 state law prohibiting interference with navigation which he said construction on the river violated.

Tacoma Plans Appeal

Tacoma officials announced they would appeal to the state supreme court to set aside the injunction until the higher court can rule on the case. Contract's totaling some $15 million have been awarded for the Mayfield dam and powerhouse on the Cowlitz, and construction has been underway for several months.

Should the higher court uphold Judge Wright's ruling, Tacoma could turn over its Federal Power Commission license to private utilities who have expressed an interest in the project, said Dean Barline, the city's director of utilities.

Testimony which established the river's navigability often bordered on comic opera. One witness, Mrs. Mary Kiona, an old Indian who gave her age as 99, listed a number of persons who had traveled on the river.

Under cross examination she stated that the navigators she listed had died many years ago and that she hadn't traveled on the river herself "since I was a little girl—about 20 years ago." Someone, she explained, had borrowed her canoe and never returned it.

Other witnesses testified that the river was extremely dangerous in the canyon dam site.

The latest trial involved the test case filed by the city against its taxpayers and the state fish and game departments which was decided in the city's favor in 1953 by the state supreme court. State attorneys reopened the case last summer, contending the supreme court had not ruled on questions of navigation and condemnation.

In his oral decision, Judge Wright ruled that the state had proved the river was used to some extent for public navigation through testimony by Indians who said they had traveled on its waters. Once a river is found navigable, he continued, it remains legally so even if it is not used for 100 years.

Changes in Capacity Reported to FPC

PLANT ADDITIONS DURING NOVEMBER

State	Utility	Plant	Fuel	Capacity
Me.	Loring Air Force Base	Loring	IC	2,500
N. Y.	Long Island Lighting Co	Far Rockaway	S	10,000
N. Y.	Long Island Lighting Co	Blenwood	S	20,000
N. J.	Public Service Electric & Gas Co	Burlington	S	185,000
Ohio	Ohio Valley Electric Corp	Kyger Creek	S	180,000
Ind.	Indiana-Kentucky Electric Corp	Clifty Creek	S	180,000
Ind.	Chicago District Electric Generating Corp	State Line	S	191,000
Ill.	Woodstock Municipal Light Plant	Woodstock	IC	2,610
Wis.	Wisconsin Power & Light Co	Rock River	S	75,000
Iowa	Lenox Municipal Light Plant	Lenox	IC	371
Iowa	Corning Municipal Utilities	Corning	IC	1,360
Kans.	Kansas Power & Light Co	Tecumseh	S	30,000
Kans.	Hillsboro Municipal Electric Dept	Hillsboro	IC	900
N. C.	U. S. Navy Engineers	Cherry Point	S	5,000
Fla.	Florida Power Corp	George Turner	S	60,000
Ala.	Tennessee Valley Authority	Colbert	S	180,000
La.	Louisiana Power & Light Co	Nine Mile Point	S	125,000
Wash.	U. S. Army Engineers	Chief Joseph	H	64,000
Calif.	Los Angeles Dept. of Water & Power	Valley	S	156,250
	RETIREMENTS			
Mass.	Boston Edison Co	Moody St.	H	250
Pa.	Philadelphia Electric Co	Schuylkill	S	44,000
Iowa	Interstate Power Co	Clermont	H	520
Iowa	Corning Municipal Utilities	Corning	IC	137
W.Va.	Virginia Electric & Power Co	Ronceverte	S	8,000
Ga.	Georgia Power & Light Co	Spring Creek	H	800

U. S.	Hydro	Steam	IC	Total
Added	64,000	1,397,250	7,741	1,468,991
Retired	1,570	52,000	137	53,707
Adjustments Plus	.....	.....	850	850
Adjustments Minus	92	.....	.....	92
Net Change	62,338	1,345,250	8,454	1,416,042

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of December 1—Hydro, 24,807,888 kw; Steam, 86,376,745 kw; IC, 2,365,191 kw; Total, 113,549,824 kw.

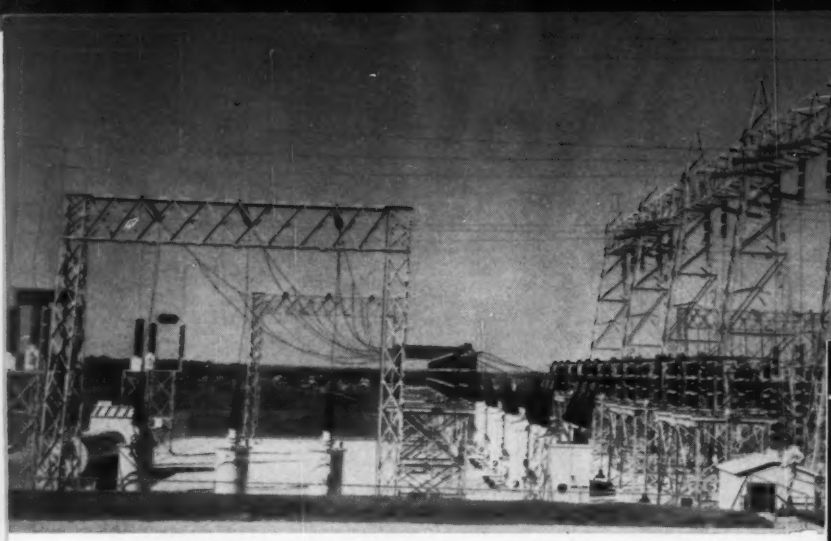
AIM Names 34 Utilities as Excellently Managed

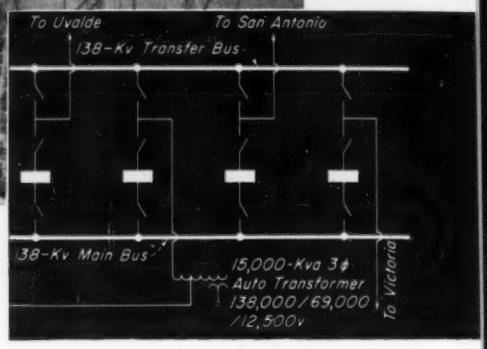
Thirty-four electric utilities were recently certified as excellently managed by the American Institute of Management.

The purpose of the awards is to "bring deserved recognition to those companies whose managements are doing most to increase productivity, with accompanying benefits to employees, shareholders, their community neighbors, and to the economy as a whole," said Jackson Martindell, president of the AIM.

The honored companies are American Gas & Electric Co; Atlantic City Electric Co; Baltimore Gas & Electric Co; Boston Edison Co; Central & Southwest Corp; Cincinatti Gas & Electric Co; Cleveland Electric Illuminating Co; Columbus & Southern Ohio Electric Co; Consolidated Edison Co of New York; Commonwealth Edison Co; Consumers Power Co; Detroit Edison Co; General Public Utilities Corp.

Also Georgia Power Co; Hartford Electric Light Co; Idaho Power Co; Iowa-Illinois Gas & Electric Co; Iowa Power & Light Co; Kansas Power & Light Co; Monongahela Power Co; Montana Power Co; Niagara Mohawk Power Corp; Ohio Edison Co; Pacific Gas & Electric Co; Pacific Lighting Corp; Pacific Power & Light Co; Pennsylvania Power & Light Co; Southern California Edison Co; Southern Co; Tampa Electric Co; Texas Utilities Co; Toledo Edison Co; Union Electric Co of Missouri; and Virginia Electric & Power Co.





PLEASANTON SUBSTATION was designed for a contaminated atmosphere. It has increased leakage distances and several other special features. Its design, as shown in the schematic drawing below, is simple and includes the minimum of breakers. There are only four

Contamination Dictates Design

SUBSTATION
Design

Creepage distance tolerance, special vertical bus, and flying taps are some freatures of Central P&L's Pleasanton Substation

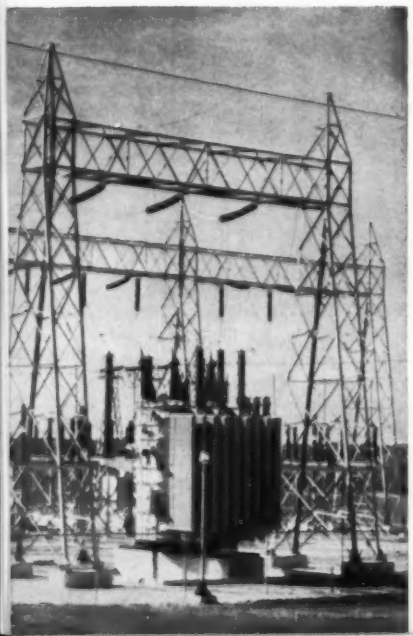
J. R. DICKEY, Substation Design Engineer, Central Power & Light Co, Corpus Christi, Texas

Pleasanton substation, important switching center for the Central Power & Light Co's 138-kv system, 30 miles southeast of San Antonio, Texas, has unusual provisions against atmospheric contamination.

Three 138-kv circuits of 336-MCM ACSR conductor enter the substation. One circuit forms the interconnection with the San Antonio Public Service Board; another goes east to Victoria, Corpus Christi, Laredo, and the Rio Grande valley; and, the third west to Uvalde. A loop will be completed later this year from Laredo to Uvalde.

69-Kv System Reinforced

At Pleasanton the 69-kv system is reinforced by tapping the 138-kv system with a 15,000-kva autotransformer. The 12.5-kv tertiary terminals are brought out to cover bushings and are equipped with lightning arresters but are not otherwise used. Station design includes only four circuit breakers, one for each line and one for the tap to the autotransformer. Breakers are the new combination pneumatic-hydraulic operating mechanism type, selected for mechanical simplicity and higher operating speeds. They are 138 kv, 2.5-million kva interrupting rating.



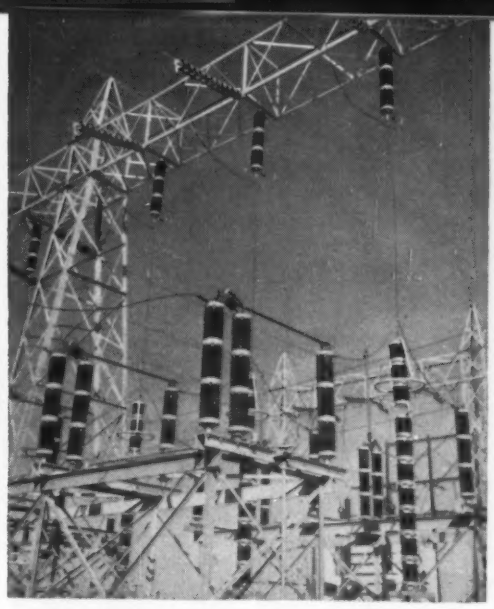
69-KV SYSTEM is reinforced by tapping the 138-kv system through the 15,000-kva autotransformer with a 12.5 tertiary

Allows for Bus Expansion

Although a 138-kv substation, Pleasanton has conventional 161-kv insulation. The transformer and breakers have "hybrid" bushings. The outside portion of the bushings was designed for 161-kv class insulation; the interior for conventional 138 kv. Accordingly they can be replaced with conventional 138-kv bushings having the same size fittings and same interior dimensions.

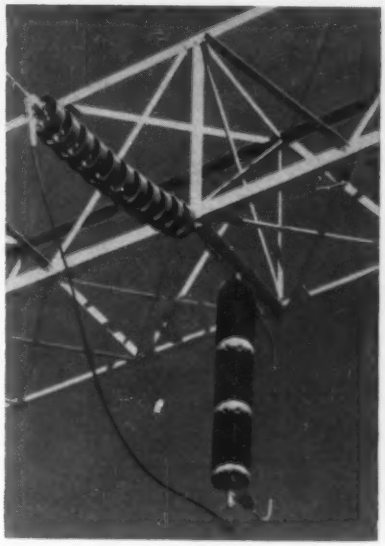
The top three sections of the arresters arcing ring are hung at the end of a vertical bus. Weight of these parts damps vibration of the bus in the wind. A spring joint allows for bus expansion.

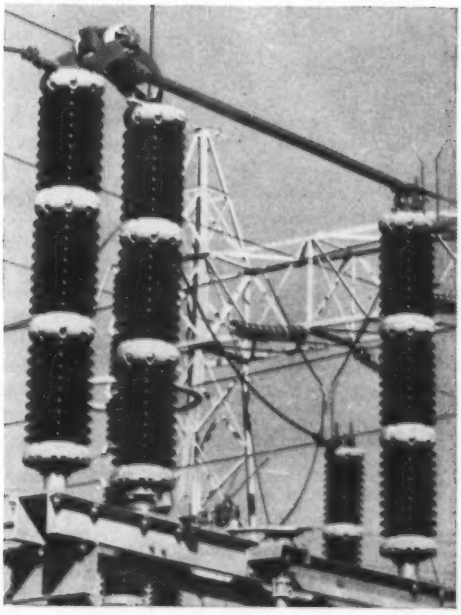
Station post-type insulators, suspending the top of the bus, replace strain insulators. Contamination prompted this substitution, the designers recognizing that such an in-



INSULATION is 161-kv class to overcome contamination problem and the gaps provide the equivalent of 138-kv insulation at Pleasanton

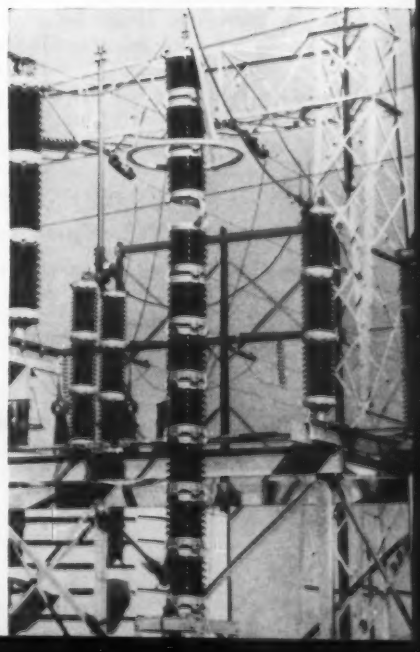
POST-TYPE INSULATORS, being less susceptible to contamination, suspend vertical bus by means of special fittings at top and bottom to adapt them to this application

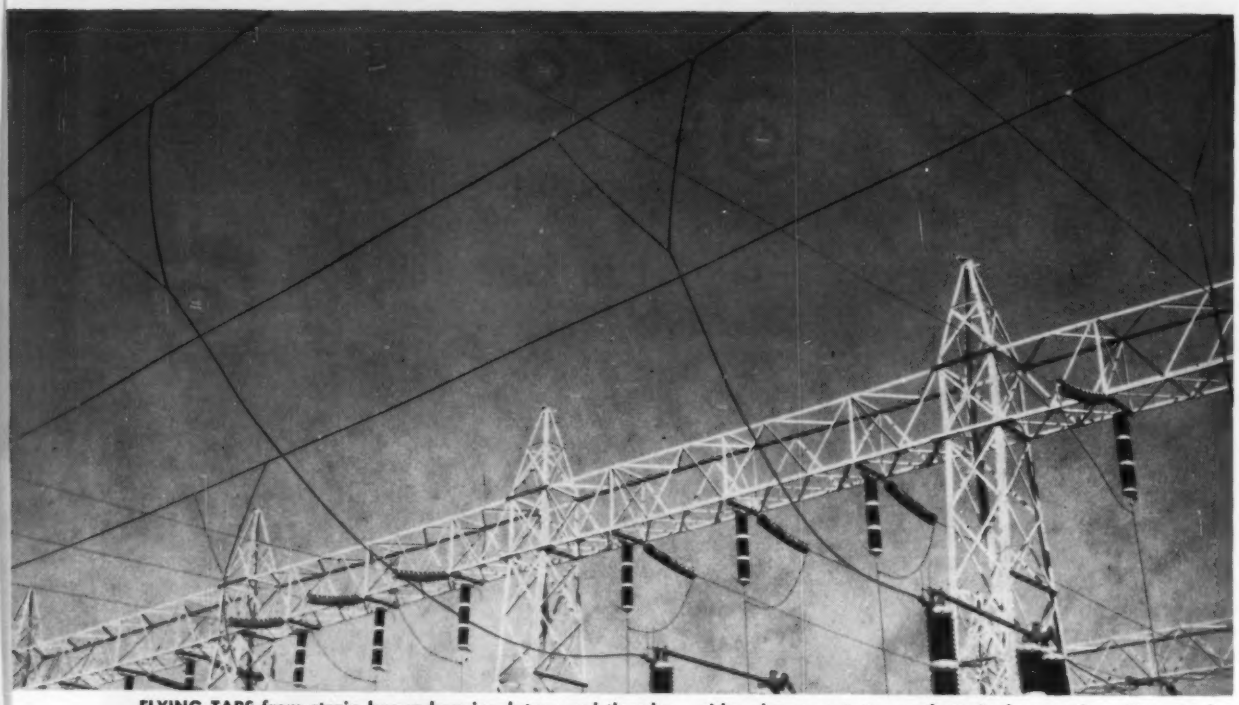




SWITCH BLADE length was interpolated from NEMA standards for 115 and 161-kv to get right length for 138-kv. Gaps limit flashover voltage to the value for such operation

VERTICAL BUS is stabilized by weight of top three sections of arrester and arcing ring supported by bus. Spring expansion joint connects to the remaining arrester sections





FLYING TAPS from strain bus reduce insulators and thereby contamination problems. Triangular design of taps with 5-ft sides damps out tap and strain bus motion. Compression connectors are streamlined for the suppression of corona

sulator is not made for use under tension.

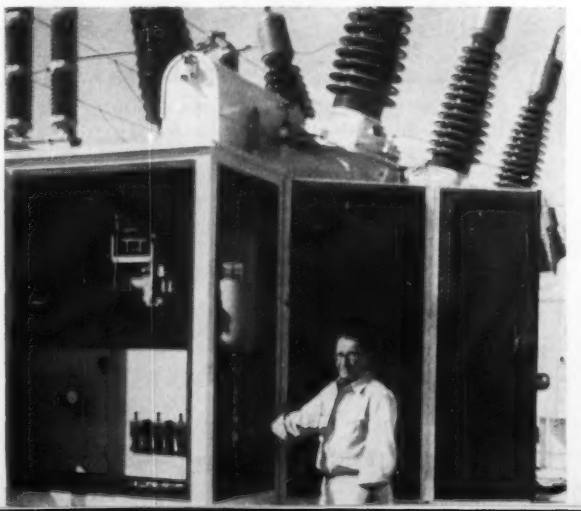
For this application, the post-type insulators have been equipped with two special fittings. A flanged fitting at the top has a 5-in. bolt circle to attach to the insulator and a tongue which fits the steel work. The flange at the lower end has a U-bolt-type strain clamp for connection to the top of the vertical bus.

Flying taps from the strain bus, also prompted by contamination conditions, eliminated 27 insulators per bus section of four bays. In a conventional design such insulators would have been needed. Their elimination not only saves their cost but removes equipment subject to contamination.

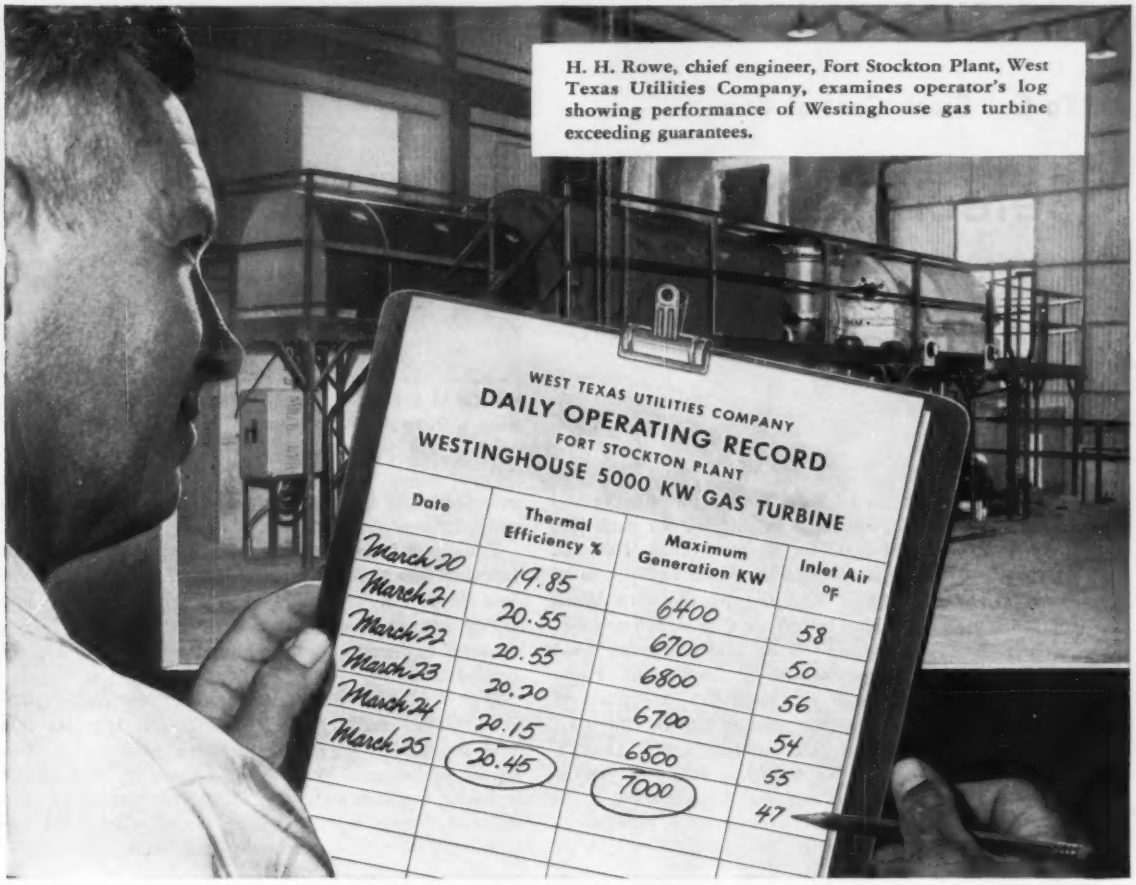
Connectors Compression Type

The flying tap is a modification of the earthquake-proof design widely used in southern California. For each lead two taps are made to the strain bus at points 4 ft apart. These are brought together so that the leads and the section of the strain bus form a triangle with 5-ft sides. The connectors are compression type, streamlined for corona suppression. The strain bus forming one side of the triangle, the tap runs from the point opposite the strain bus to the disconnect switch. The triangular connection damps out motion of both tap and strain bus and prevents excessive vibration in the wind.

Blade length of the air break switches was interpolated for insulation coordination from NEMA standards for 115 and 161-kv switches. It provides correct metal-to-metal distance for the 138-kv operation. Gaps installed on insulators for 138-kv distance limit flashover voltage to the standard value for 138-kv operation. In view of the contamination problem, however, 161-kv creepage distance has been provided.



COMBINATION PNEUMATIC-HYDRAUILC breaker mechanism was selected for its mechanical simplicity and high speed



H. H. Rowe, chief engineer, Fort Stockton Plant, West Texas Utilities Company, examines operator's log showing performance of Westinghouse gas turbine exceeding guarantees.

FACTS on Westinghouse 5000-kw gas turbines . . .

Exceeds guarantees in first 14,000 hours

Good operating procedures and teamwork with Westinghouse have helped West Texas Utilities Company get top performance from the gas turbine at its Fort Stockton station. The unit is rated 4700 kw at 18% efficiency (3300 ft. altitude). A recent operator's log shows outputs as high as 7000 kw at over 20% thermal efficiency.

This significant accomplishment has been achieved with a minimum of maintenance. In fact, a recent scheduled inspection of the turbine showed this fact:

- Turbine and compressor rotor blading in excellent condition after 14,000 hours' service.

This is proof of the good design and high quality of Westinghouse gas turbines. It is also indicative of how well Westinghouse gas turbines can serve your power generation requirements.

• • •

GET ALL THE FACTS about the good performance you can expect from gas turbines. Call *The Man With The Facts,* your Westinghouse sales engineer, or write for a copy of booklet B-5887, *Westinghouse Gas Turbine Power Plants for Electric Power Generation.* Westinghouse Electric Corporation, 3 Gateway Center, Pittsburgh 30, Pa. J-50577

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YOU CAN BE SURE... IF IT'S Westinghouse

MEETING REPORT

To Cut Brush Control Costs . . .

Select Herbicides for Each Job

PRINCIPAL SPEAKERS on control of weeds on rights-of-way were S. G. Pugh, W. C. Bramble, and R. I. Kauffman

Herbicides and methods of application for effective and economical brush control must be selected for each job. There is no best technique for all conditions. This was the consensus at the joint meeting of the newly created Weed Society of America and the Northeastern Weed Control Conference held at New York City on January 4-6.

A new technique, which will be added to other tried and proven ones, was described by Stephen G. Pugh, Southern Bell Telephone & Telegraph Co. It consists of injecting a herbicide into the ground toward the root crown of weeds. Best results are obtained with either a 2% solution of 2,4,5-T in No. 2 fuel oil or 8 lb of Telvar DW in 100 gal of water. Pugh said the chemical is injected 4 in. below the ground level under a pressure of 300 psi. The number of injections depends on size of stem.

Southern Bell has been "roasted" occasionally by newspapers because of brownouts on rights-of-way, Pugh said. To avoid such criticism and educate the public, the company has prepared a brochure with color pictures to show that chemical control is not a scorched earth program. The brochure points out that brush—not grass—is only brown after the initial eradication, and brown spots persist only until hardier brush species are killed.

One large-scale browning of rights-of-way is all that several states will permit, commented R. I. Kauffman, Asplundh Tree Expert Co. Within this limit of only one browning, he said, the following techniques will give the cheapest and best job:

1. Spray lower 4/5 of foliage and stems to run off with about 6 lb of 2,4-D and 2,4,5-T per 10 gal of oil and 90 gal of water.

2. Spot hard-to-kill species two years later with a basal spray of about the same consistency.

3. Spot the R-O-W with a basal spray in future years according to need.

W. C. Bramble, Pennsylvania State University, said that five spray techniques tried on a R-O-W gave adequate top kill. Resurge was lowest for three treatments: the oil-water semi-basal, summer basal, and broadcast foliage Ammate. A follow-up basal spray applied a year later vastly improved brush control. Data indicated that oil-water with basal follow up was least costly. However, Bramble cautioned that his data are not a fair comparison of minimum costs because maximum brush kill was an objective of the test. Improved game food conditions resulted from all treatments.

Training of application crews is probably the most important job to be done, stated F. A. Ashbaugh, West Penn Power Co. The job is very specialized, and only low-quality labor will do such work. For these reasons it behooves engineers to write simple instructions and devise simple techniques.

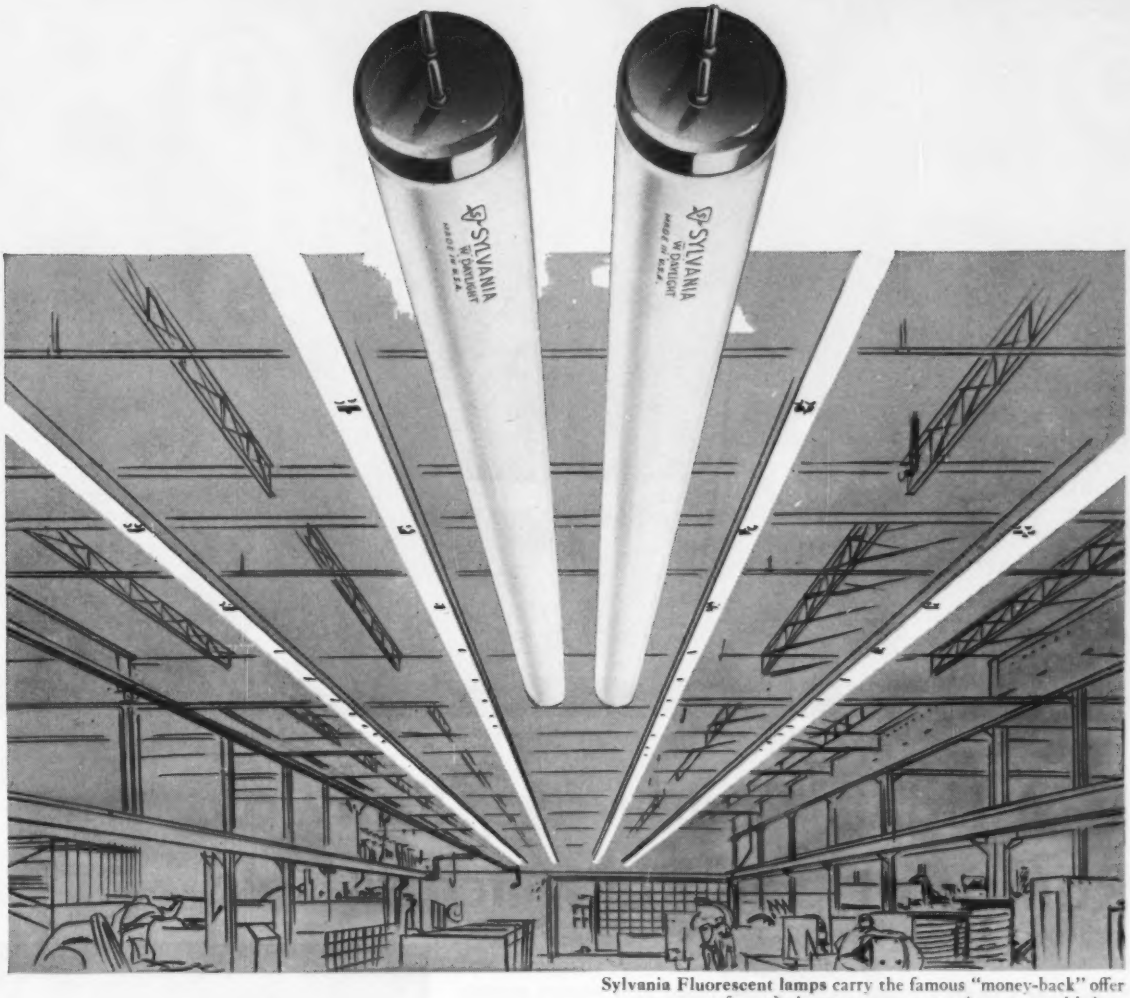
Savings of $505 per acre over a 20-year period result from maintenance of R-O-W with chemicals rather than cutting, related J. W. Suggitt, Hydro-Electric Power Commission of Ontario. This saving is based on costs of $70 per acre for cutting every third year compared with chemical control costs per acre of $27.40 for the first spray, $21.90 for second spray two years later, $16.40 for subsequent treatments every four years.

Cane-foliage treatment consisting of an oil-water spray applied to the lower 4/5 of foliage and stem provides more penetration and translocation of chemical in the plant, said R. H. Beatty, American Chemical Paint Co. Thus, this treatment is very effective provided good application and formulations are used. He suggested 6 lb of acid in 10 to 15 gal of oil and enough water to make up 100 gal.

R. M. Latham, Pennsylvania Game Commission, said there is very little difference between the rights-of-way that utilities want and those that game representatives want. He pictured this R-O-W as consisting of three strips: A center swath of herbs, grass, and legumes, and strips on both sides containing food producing shrubs, dogwoods, etc, which grow to 8 ft max at the outer edge. Game representatives are opposed to continual foliage spraying, Latham continued. They want a quick brush kill and a clean R-O-W. They oppose use of chemicals like sodium arsenic that kill both brush and game.

When to apply herbicides is one of the most important problems that needs to be determined, said J. L. Arend, Lake States Forest Experiment Station. Hardwoods seem to be most sensitive immediately following foliage development.

This was the charter meeting of the Weed Society of America, founded by the four regional conferences. Officers elected were: Pres, W. B. Ennis, Jr, Mississippi State College; Vice Pres, A. S. Crafts, University of California; and Business Manager, W. C. Jacob, University of Illinois.



Sylvania Fluorescent lamps carry the famous "money-back" offer to outperform the lamps you are now using, as stated below.

These are the lamps that raise plant efficiency and lower lighting costs

Modern management recognizes good lighting as a potent plant tool that consistently helps lower costs and increases production.

Among many of the country's largest industrial producers Sylvania Fluorescent lamps are first choice for economically efficient, long-lasting, high-output illumination . . . and quality of the finest degree possible is one of the prime reasons for their position of preference.

Equally important, when they buy Sylvania Fluorescent lamps they buy lighting satisfaction which carries this "money-back" offer:

- ***We'll buy back, at the price you paid, any Sylvania Fluorescent lamps that do not, in your opinion, outperform any other fluorescent lamp you are now using, on the basis of uniformity of performance and appearance, maintained brightness and life.***

Learn, without obligation, how better lighting with Sylvania Fluorescent lamps can help improve production and lower costs. Call your Sylvania Supplier, or write:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division—Dept. 6L-2802
60 Boston Street, Salem, Mass.

In Canada:
Sylvania Electric Products Inc. (Canada) Ltd.
University Tower Building, Montreal

SYLVANIA

. . . fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

ROADWAYS AND PARKING AREAS are lighted with L-M Spherolites® with mercury vapor lamps.

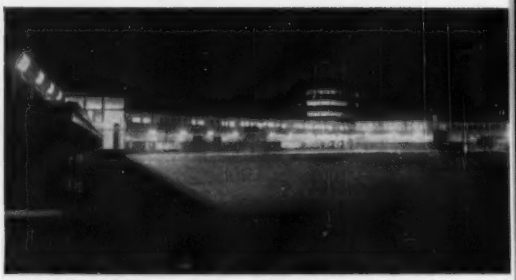
L-M Lights Roadways, Runways, and Ramps at General Mitchell Field

Milwaukee County's magnificent new air terminal at General Mitchell Field provides the latest facilities for comfort, convenience, and service of passengers flying in and out of the big midwestern metropolis.

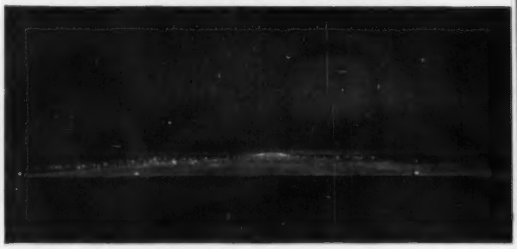
The newly dedicated terminal is a beautiful low modern building nearly 1000 feet long. The arriving traveler finds such modern conveniences as automatic doors, escalators, the latest in lighting, a wide range of facilities for his comfort and convenience. The new airport is not only a great focal point for Milwaukee County but also a model for airline terminals everywhere.

Approach roadways and the huge 2000-car parking area are lighted by L-M mercury vapor units on steel poles. Loading ramps are illuminated by L-M's latest fluorescent luminaires, whose broad light sources provide ample illumination with a minimum of glare to incoming pilots. Runways for planes are marked with L-M's high intensity Thermal Beam™ runway lighting units.

L-M provides a complete line of incandescent, mercury vapor, and fluorescent lighting and equipment for outdoor installations—for street lighting, airports, roadways, shopping centers, parking areas. L-M's runway lights are the culmination of years of development by the leader in airport runway lighting. For complete information on L-M products and services, ask the L-M Field Engineer or Lighting Engineer; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



RAMP LIGHTING—154 of L-M's new fluorescent units provide a high level of illumination without glare to pilots.



RUNWAY LIGHTS—L-M's Thermal Beam units compensate in both intensity and direction for fog and other low-visibility conditions, by toeing in as intensity is stepped up, toeing out as intensity is lowered in clear weather. Smaller L-M lights light taxiways.

LINE MATERIAL

Street and Airport Lighting

Here's an outstanding new development for RESIDENTIAL AREA LIGHTING

L-M's New Open Type Luminaire For Small Mercury or Incandescent Lamps

This completely new development in luminaires offers these advantages:

1. Pleasing appearance for residential areas.

2. Specially designed for the new 100 watt (3300 lumen) and 175 watt (6800 lumen) mercury vapor lamps.

3. Also efficiently handles incandescent lamps up through 6000 lumens.

4. Holophane® refractor glassware will provide type II 4-way offset, standard type II, type I, and type III patterns.

5. Open glassware provides for excellent cooling, larger lamps, easy re-lamping.

6. Alzak aluminum reflector, latched for direct attachment to Standard NEMA head.

7. L-M's V-band attachment provides easy replacement of glassware.

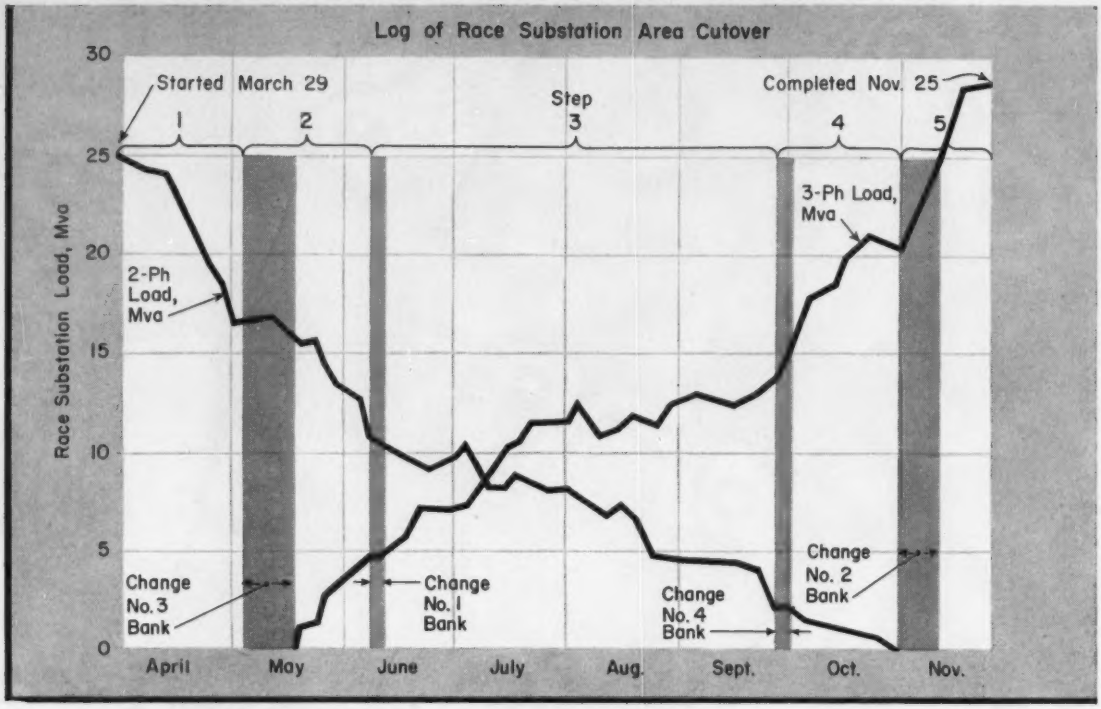
8. Modestly priced, but because of its design the luminaire handles much larger lamps than other luminaires at this price.

Ask the L-M Field Engineer for information on features, design, and delivery of the several types. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

233

LINE MATERIAL

Street Lighting



Step 1—Convert 10 Mva of distribution to 3 phase and transfer it to adjacent 4-kv substations.
This load transfer permits Race No. 3 bank to be released and re-connected to 3 phase.
Step 2—Convert 5 Mva to 3 phase and connect to converted Race No. 3 bank.
This conversion permits Race No. 1 bank to be released and re-connected to 3 phase.
Step 3—Convert 9 Mva to 3 phase and connect to 3-phase bus with firm capacity from No. 3 and No. 1 4-kv banks.
This conversion permits Race No. 4 bank to be released and re-connected to 3 phase.
Step 4—Convert remaining 2-phase distribution to 3 phase and connect to Race 4-kv banks.
This conversion completes cutover and releases Race No. 2 bank for re-connection.
Step 5—Transfer back 10 Mva placed on other stations by Step 1, plus additional load as required.

Coordinated Plan Changes 2-Phase Distribution to 3 Phase as . . .

Conversion Boosts System Capacity

DISTRIBUTION
Operation and Design

- **Advantages of 4-kv 3 phase are attained by revamping existing 2.4-kv 2-phase substations and primary feeders**
- **Expense of changing customers' wiring and equipment is minimized by retaining 2-phase secondaries for power service**

C. E. NELSON, Supt., Engineering Division, Transmission & Distribution Department, Philadelphia Electric Co., Philadelphia, Pa.

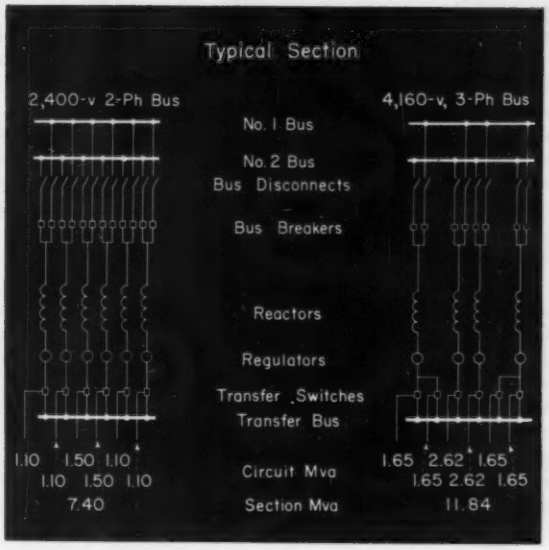
Converting distribution substations and primary feeders to 4,160-v, 3-phase in Philadelphia Electric Co's 2-phase service area is providing needed additional capacity at low incremental cost. Changing 111 circuits since 1951 has added 95,500 kva of circuit capacity and postponed the erection of several new substations. Had 2,400-v 2-phase been retained as the primary supply, the 45,100-kva load growth in these circuit areas would have required at least 30 new 1,500-kva circuits.

Reconnection of existing substation equipment and of circuit cable and open wire provides this capacity increase at low cost. Capability of circuit wires and cables is boosted 50% with a 25% cut in losses. Reconnecting cables sometimes runs the capacity increase up to 65%.

Converting secondary power customers' wiring and equipment, which cost $10 to $15 per hp 25 to 30 years ago, has now skyrocketed to prohibitive estimates of $60 to $75 per hp. Moreover contractors show little desire to bid on jobs of this type, spread over long periods with considerable inconvenience to customers. Solution has been found for

Race Substation gains 16,950 Kva Capability by Conversion of 26 2-Phase Circuits to 17 of 4,160-V 3 Phase.

	Used for 3-Phase	Available from 2-Phase
No. of Circuits: Single cable	8	24
Double cable	9	2
Spare to transfer bus	1	1
No. of Cables: 3 x 250MCM	15	17
3 x 500MCM	11	11
No. of Bus Breakers	36	54
No. of Feeder Regulators:		
200 amp 10%	0	22
400 amp 5%	36	14
300 amp 10%	0	16
600 amp 5%	18	2
No. of Reactors: 1.1% 5.81 kva	0	26
3.2% 32.26 kva	54	28
Total Circuit Capacity, kva	50,700	33,750
Total Firm Transformer Capacity, kva	48,000	32,000



this program in leaving customers' wiring and equipment unchanged on 2-phase secondaries which are supplied from the new 3-phase primaries by Scott-connected distribution transformers.

To Philadelphia Electric Co with 900,000 kva of capacity in 675 2-phase circuits representing about $36 million, this new capacity looked attractive. Conversion was started in 1952 in outlying residential areas where load growth is rapid and polyphase load light. Now it has spread to more congested areas with heavier polyphase load. Eleven circuits were converted in 1952 for 11,900 kva of new capacity; 28 in 1953 added 36,800 kva, 29 in 1954, 20,600 kva and 43 in 1955, 26,200 kva. The 1956 program will change 38 circuits for a gain of 43,540 kva. The conversion is expected to continue as load growth in the 2-phase area demands new circuit capacity.

Changeover Is Economical

Comparative costs for continuing a 2-phase primary system versus changing over to 4,160-v 3 phase in all of the areas changed have indicated that changeover is the more economical method of providing additional capacity. In the Race Substation area, for example, the total cost of the changeover will be completely recovered in 8 yr. Each year thereafter net savings of approximately $117,000 in carrying charges will be realized. Continuing the 2-phase plan would have required a capital expenditure of $1,156,000 by the end of 1963 while the 3-phase plan required $373,500.

The conversion program involves work at these five major points:

1. Substation transformers.
2. Outgoing feeder equipment.
3. Feeder neutrals.
4. Distribution transformers.
5. Customer installations.

Substations built 25 to 35 years ago had two to four banks of two 3,750-kva single-phase transformers Scott-connected. Firm ratings with fan cooling were generally 11,000 kva for two banks, 22,000 kva for three banks, and 33,000 kva for four banks. Changeover to add 50% capability here required only the addition of another 3,750-kva transformer in space provided by the original design, and reconnecting the bank. The 3-conductor 2-phase buses were suitable for operation at 4,160 v 3 phase with the neutral run separately.

More recent building-type substations comprised two or three 7,000-kva 2-phase banks. Firm ratings were 11,000 kva for two banks and 22,000 kva for three. Conversion in these stations required replacing 2-phase banks with 10,000-kva 3-phase banks. Ratings thereby were boosted to 15,000 kva for two banks and 30,000 kva for three.

Duplex substation 3,000-kva units were replaced with 3-phase 5,000-kva units for a 67% gain in capability. The 2-phase units were re-located to other areas where changeover is not imminent.

Substantial economies were achieved in revamping outgoing feeder positions of the old substations. At Race Substation, for example, 17 outgoing 3-phase circuits were provided to replace the existing 26 2-phase circuits. Nine of these were doubled in amp capacity by feeding two cables from a single compartment. This program of paralleling cable and boosting voltage to 4,160 gave 50,700 kva of feeder capacity in place of 33,750.

Existing Equipment Re-used

Regulators for these 17 feeders and the feed to the transfer bus were provided by regrouping the 54 previously connected in pairs in each 2-phase position. And reconnecting them for ±5% instead of ±10% gave them current capability for the new duty. Existing switchgear was sufficient for the new requirements, but 26 of the 54 current-limiting reactors had to be replaced. More details are given in the table.

More recent substations already had 500 MCM 3-conductor cable on the 2-phase feeders. Conversion to 3-phase added enough capacity that some of these cables could be cut out of service until required for future load. In a typical case ten 4-kv feeders will carry more load than the existing 14 2-phase circuits leaving four cables for future growth. Savings for this class of substation were mainly in the ability to distribute the

increased bank capability with several less feeders.

Each 3-phase circuit required a third reactor and 300-amp regulator with associated control equipment. Most of these were already available by transfer from the extra 2-phase feeders. Some triplex regulators were installed to release pairs of single-phase regulators to complete other feeder equipments.

The first major step outside the substations was forming a common neutral system connected to the station ground. Wire extensions were made to tie together the secondary neutrals. Few circuits required extensions in excess of ¼ the circuit length, except in recently developed areas where secondary mains often run on the rear walls of the houses.

First use of this new common neutral was to transfer the connection of single-phase distribution transformers from the common wire of the 2-phase source. The cleared wire thus became available for use as the third phase wire of the ultimate 3-phase circuit.

Pairs of single-phase transformers serving 2-phase secondaries were replaced with Scott-connected 4,160-v transformers. Banks of 15, 30, 50, 75, and 100 kva were purchased in single-tank design to cut labor cost and improve appearance. Larger loads are served with separate main and teaser transformers rated 75, 100 and 167 kva. Main and teaser transformers are not interchangeable, and the teasers were designed for full rating to cut bank cost per kva. Average cost of these Scott-connected banks ranged from 20% below equivalent 3-phase banks for the smaller sizes to 1% over for large sizes.

Primary customers involved in the changeover up to the end of 1955 numbered 157 with an average billing demand of 150 kva. Service entrance facilities usually comprise a metal-clad circuit breaker and disconnects, metering equipment, and transformers for the desired utilization voltage.

Philadelphia Electric Co assumed the cost of installing a metering cabinet complying with its modern use of inverted sequence metering, and of replacing customers' circuit breakers under 50,000 kva interrupting rating with breakers suitable for that duty. It also replaced customers transformers with new Scott-connected transformers of equal or greater rating, billing the customer for the incremental cost of any increase in capacity desired by the customer. Where interruptions for changeover could not be tolerated, the utility provided temporary facilities to maintain service while contractors changed the regular equipment. Company expenditures for primary customer changeover have averaged $18.70 per kva of demand.

Smaller power customers fed from the secondary system have no changes to make because 2-phase service is maintained by the new Scott-connected distribution transformers. Thus costly conversion of equipment owned by these customers is eliminated.

NEMA Unit Promotes Electric Heating

The first nationwide program for promoting residential electric heating throughout the industry was inaugurated recently at a meeting of the newly organized public information committee of National Electrical Manufacturers Association's Electric House Heating Equipment Section.

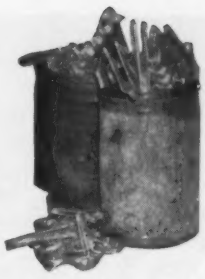
Members of the committee, together with NEMA's managing director and the section's secretary are shown above. They are, from left to right: Myron Miller, recording secretary, NEMA Electric House Heating Equipment Section; Melvin H. Wessel, sales manager, Cavalier Corp; Committee Chairman Stanley B. Aronson, sales manager, Berko Electric Manufacturing Corp; Robert E. Pequignot, vice president and general manager, Electromode Division, Commercial Controls Corp; J. F. Miller, NEMA's managing director; and LeRoy Staunton, sales manager, Uskon Heating Materials Division, U. S. Rubber Co. Not present is fifth committee member Robert E. Smith, manager of product planning, General Electric Co.

POWER BRIEFS

● Black Hills Power & Light Co plans to invest $2.5 million for construction during the year.

● A contract for purchase of up to 30,000 kw of power from Arizona Public Service Co has been signed by Arizona Power Authority and the utility. It provides that the authority will take power from the utility's Saguaro steam plant at Redrock for resale to its customers including electrical districts and co-operatives. The agreement, under negotiation for two years, is subject to cancellation by the authority after 10 years.

● Nashville, Tenn., is considering construction of its own power plant as one of several alternatives in the event Tennessee Valley Authority cannot guarantee the city adequate power. The city has been negotiating with TVA for the past year for renewal of its contract which expires in 1959. If by May 4 TVA finds it cannot deliver adequate power, the city may start its own plant, for completion in 1959. Another plan being considered is issuance by the state of revenue bonds for the building of new power plants to be operated by TVA.



$30,000 worth of Busted Clamps

Short of actually breaking a clamp, how do you know how strong it is? In the past five years, we've broken 10,000 clamps in routine testing. We do it to make sure that strength and quality are maintained. The carnage goes on every day (though it really takes a very slight percentage of our clamp production) as a part of O-B statistical control of product quality.

It might seem that such hardware mayhem would tell us only how strong a great big bunch of clamps *were!* Not so. Observations of ultimate clamp strength, and its variations within successive lots, allow us to predict with statistical certainty the strength of clamps we ship to customers.

This breakage has cost close to $30,000 in the past five years. We think that's a cheap price to pay for the ability to GUARANTEE the minimum strength of clamps we ship!

Breaking clamps, and profiting by what we learn from the broken bodies, is one phase of the Technical Competence concept you'll find at work throughout the O-B organization.

OHIO BRASS COMPANY • MANSFIELD, OHIO

TECHNICAL COMPETENCE

THE HEART OF ALL *Ohio Brass* HARDWARE

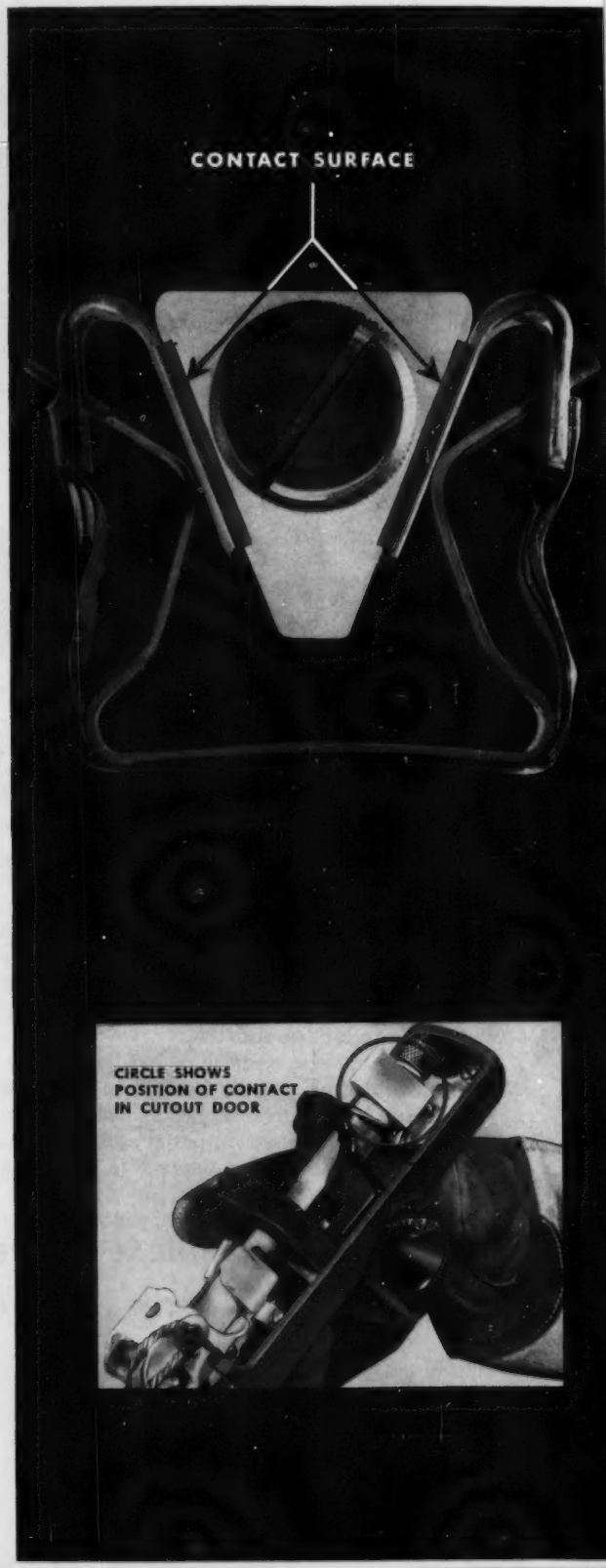
4662-H

old

Ball-point contacts hit on only one spot. Can result in pitting, wear, corrosion—and possible overheating.

new

"V"-wedge contacts line up solidly, both sides . . . make for a high-pressure, multi-point, low-resistance contact.



ALL-NEW ENCLOSED FUSE CUTOUTS

now...

Self-aligning 'V'-wedge contacts have multi-point contact surfaces, add years to cutout life

Cutout life is extended in General Electric's all-new Enclosed Fuse Cutout line because of this unique construction which gives positive high-pressure, multi-point, low-resistance contact. In addition, these exclusive "V"-wedge contacts are free-floating and self-aligning—to assure you of positive contact every time. Broad surfaces of contacts are silver plated to protect against corrosion and maintain low resistance.

EVEN AFTER YEARS OF SERVICE, the faces of these "V"-wedge contacts stay bright, clean, shiny. Resistance is kept low—and cumulative overheating doesn't even get a chance to cause an outage.

In old-style contacts, pitting, arcing and overheating could result from single-point contact—G.E.'s completely new "V"-wedge contacts eliminate these difficulties.

EVERYTHING IN ONE LINE—G.E.'s new Fuse Cutout line gives you all functions—indicating-dropout, indicating-non-dropout, disconnect—in one basic design. You get two current ratings, 50 and 100 amperes, and two voltage ratings, 5.2 and 7.8 kva, to match every possible system demand.

LINEMEN WILL LIKE the other new features of the new G-E Fuse Cutout line. The safety-grip door handle, for instance, that ends switch-stick juggling—and the unique plastic-to-metal latching that prevents door "freezing." In addition, fusing and line connecting have been made extra easy for fastest possible installation and servicing. For a complete description of the new cutout line, write for Bulletin GEA-6208, General Electric Company, Section 433-13, Schenectady 5, New York.

THIS NEW G-E FUSE CUTOUT

has all the features most engineers and linemen prefer. Logically so, too—hundreds of reports of the features they wanted were collected and evaluated. Their best ideas were incorporated into the new cutout design.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Now...Wagner Form W Transformers are smaller, lighter in weight

Even before the newest trend to lighter, shorter transformers, Wagner's Form W construction resulted in small-size, lightweight distribution transformers.

Today, an improved new design makes possible a new Wagner Distribution Transformer of Form W design that is up to 17% lighter, 18% shorter, and requires less oil than any *previous* Wagner Pole Type Transformer.

For you, this means greater ease of handling, less storage space required. *It also means you can save money by putting greater transformer capacity on already existing structures.*

They offer you these proven features

1 SHUR-SEAL COVER

Wagner's exclusive Shur-Seal clamping ring keeps transformer sealed air-tight... no atmospheric moisture or dust particles can get inside—no loss of oil can occur at any time.

2 SAFETY-DESIGNED HV SIDEWALL BUSHING

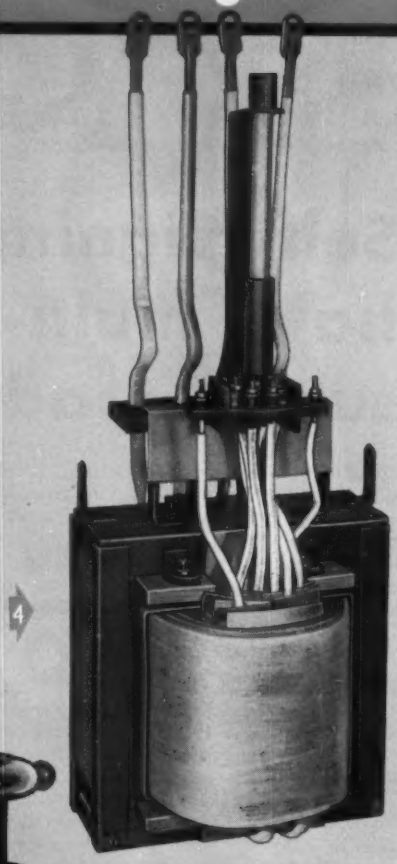
For use with either copper or aluminum conductor. Key-locked to prevent rotation. Conductor is simply pushed into connector and is tightened with a few turns of the insulated knob. Faster—easier—safer.

3 KEY LOCKED LOW VOLTAGE BUSHING

This bushing key-locks to prevent rotation... porcelain is keyed to the tank and metal stud is keyed to the porcelain. There can be no loose internal connections to cause shorts.

4 FORM W ELEMENTS

The new Form W core is of cold-rolled oriented grain transformer steel. Thermo-setting insulation bonds coil element into a solid, homogenous unit, which is braced to prevent any possibility of shifting.



These new Wagner Pole-type Distribution Transformers are available in ratings from 15 through 167 kva.

WAGNER ELECTRIC CORPORATION
6456 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

Wagner Electric Corporation
EST. 1891

T56-7

BUILT-IN WASHER-DRYER combination was unveiled by Westinghouse Electric Corp in its "Color Confection Kitchens"

Can Appliance Sales Keep It Up?

Manufacturers display confidence at Chicago show as they roll out more color, built-ins and improvements. Industry business could go up 9% says one maker

Appliance outlook for '56: More color, more built-ins, more improvements, more sales.

This was demonstrated by manufacturers at the January Appliance Show in Chicago this month where they showed the trade their new wares and confidently opened their books to take the orders.

"The major appliance industry is in a period of economic prosperity and technological improvement," declared General Electric Co's C. W. Theleen. He said the industry expects to do about 9% better this year than it did in 1955.

Even the color TV people came through with unqualified optimism. Color TV will become a volume business in 1956 predicted Allan B. Mills of Radio Corp of America who could see production hitting 200,000 to 300,000 units this year.

But the big things at the show itself again were color and built-ins. Exciting news at last year's affair, they pretty much took over this time. Westinghouse Electric Corp set up four "Confection Color Kitchens" complete with built-in automatic dryer and washer plus a refrigerator and freezer that can be stacked vertically or placed side by side. Hotpoint Co showed a modular unit which includes oven, surface cooking units, dishwasher, garbage disposer, and automatic washer and dryer. The complete unit requires only one plumbing and one electrical connection.

G.E., who says 17% to 18% of its appliance business last year was colored goods, offered color and built-in displays of a type that can be reproduced by dealers on their own sales floors. Frigidaire Division of General Motors Corp, Kelvinator Division of American Motors Corp, Gibson Refrigerator Co, and Admiral Corp likewise went heavy for built-ins in their lines.

Another crowd-pulling wrinkle was the electronic oven. At the Hotpoint booth small sausages cooked in 15 sec. Hotpoint (through a recently-announced working arrangement with Raytheon Manufacturing Co) expects to have their units in production this spring. G.E. says it will be ready to make deliveries next fall.

Other items:

- Ranges—Admiral showed built-in equipment with re-

ELECTRONIC RANGE at Hotpoint booth cooked sausage in 15 sec. Electronic unit is at top, conventional unit below

FREEZER "FILES" made by G.E. roll out from under kitchen counter. Each unit has some 5 cu ft of freezer storage space

SAFETY LATCHES like one on this Admiral refrigerator let doors open from inside. Another make uses magnets

tractable surface units. By pressing a button, the housewife turns on a motor that rolls the surface units out from under the oven. When no longer needed, they can be rolled back at another press of the button leaving the work surface clear.

Kelvinator and G.E. featured new roast temperature-control devices. Kelvinator's is a thermometer connected to an electric cord which plugs into an outlet in the side of the oven. The thermometer, inserted in the roast, operates a control when the roast is done that turns on a control panel light and turns off the oven. The G.E. unit indicates the roast's temperature by means of a thermometer dial on the control panel. Several makers, including Hotpoint, Admiral, G.E. and Gibson showed thermostatically-controlled griddles for plug-in on the range.

• Refrigerators—New safety features grabbed the spotlight here. Both Admiral and G.E. unveiled refrigerators that can be opened from the inside. The Admiral design makes use of an inside latch release that glows in the dark. The G.E. models use magnetic locks.

• Washers and Dryers—Avco Manufacturing Corp's Crosley Division introduced what it calls a super-fast dryer that can operate at 1,000, 4,000, 5,000 or 8,000 w. Easy Washing Machine Division of the Murray Corp had a washer-dryer combination said to wash and dry an average load of clothes in 70 min. Dryer's wattage is 5,000.

• Radios—Admiral showed a solar-operated radio (laboratory-model) with a battery that can be charged either by the sun's rays or a 150-w lamp.
G.E. also has announced a solar radio—a pocket-size experimental job said to work more than eight months in darkness without recharging.

Unique Utility-City Project Planned in Michigan

A unique plan calling for private utility operation of a municipally owned power plant has been devised to relieve the power famine in the Escanaba area of Michigan's Upper Peninsula.

This solution to a five year old problem was reached recently when Upper Peninsula Power Co and the Escanaba City Council signed a 30-year contract. At that time, the council also passed a bond ordinance for $7 million to construct a steam plant with 25,600-kw capability.

Under the contract terms, the city will build the plant with revenue bonds and the company, as agent of the city, will operate it. The utility will pay the city an annual use consideration that handles bond interest and retirement.

The city, with first call on plant capacity, will pay the company 1¢ per kwhr for all its power requirements. The company may use the balance of plant capacity to deliver energy into its own system. Estimated city peak will be 10,000 kw by plant completion date.

Upper Peninsula Power will pay operating costs, maintenance, and insurance. Taxes are arranged on a mutual basis and special provision is made for any capital changes or additions.

A required 30-day period must expire before the bond ordinance becomes final. It is expected that the bond issue will go unchallenged and that work on project design can begin immediately.

The Escanaba area's power problem has a long, complicated history.

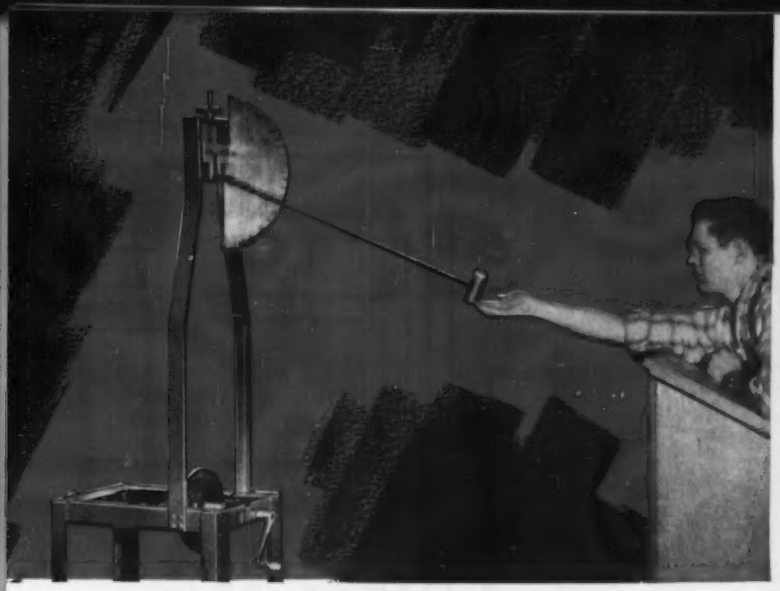
For over 40 years, the power supply has been involved with that of the principal local industry—the Escanaba Paper Co. The same interests own the paper operation as well as Upper Michigan Power & Light Co which serves the city.

After World War II rapid growth of the utility's load began to take so much of the power company's capacity that the paper mill suffered.

When Upper Michigan P&L asked the city to seek another power source, a municipal plant was considered.

Early last year Upper Peninsula Power entered the picture with an offer to buy the city's distribution system and retail energy to the customers. This was rejected in a referendum in March after a spirited campaign. Following this initial setback, Upper Peninsula promptly returned with the recently adopted proposal.

In addition to being relieved of the Escanaba load, Upper Michigan P&L plans to dispose of its rural load to Upper Peninsula Power. If the project is realized as expected, Upper Michigan can devote its entire capacity to the Escanaba Paper Co.



Insulators out of every finished batch are given this impact test, which checks the mechanical strength and density of the porcelain. Height from which hammer arm drops measures the amount of impact the porcelain will stand.

A corner of Illinois' new large laboratory. Here ceramic engineers test incoming materials, develop new ideas for improved production methods, and test products at various stages during and after production, to assure you dependable finished porcelain.

All Illinois pin-type insulators are given a 100% high voltage flashover test in this test equipment. Voltage builds up until it flashes over, or through, the insulator. If it flashes through, the insulator is, of course, rejected.

Here's a pin-type insulator that failed. This insulator was broken apart to show how the high voltage current searches out even microscopic cracks, like those indicated by the scorched lines at the top. A reject, of course.

Illinois Electric Porcelain is TRIPLE-TESTED . . . and more!

Illinois Electric Porcelain insulators are triple tested to assure the customer that he gets the highest possible quality in electrical porcelain.

Triple-testing is done (1) of incoming materials, in the laboratory; (2) during production, through our extensive quality-control system; and (3) after completion of production, before insulators are shipped, by rigid final testing. Some tests are 100%, like the "M & E" and electrical flashover tests; some are spot checks to destruction, like the impact test and over-voltage pull tests, in which strain insulators are pulled apart while under electrical and mechanical tension, to see how much pull they will take.

Today Illinois Electric Porcelain is producing high quality products with the latest precision production equipment. Illinois' laboratory provides extensive facilities for checking materials and processes, and for devising even more rigorous checks of final production. Galvanizing is done in Illinois' own completely modern galvanizing plant.

The result is that you can depend on Illinois for the highest quality product. Ask the L-M Field Engineer who calls on you for information and copy of Porcelain Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin.

ILLINOIS ELECTRIC PORCELAIN COMPANY

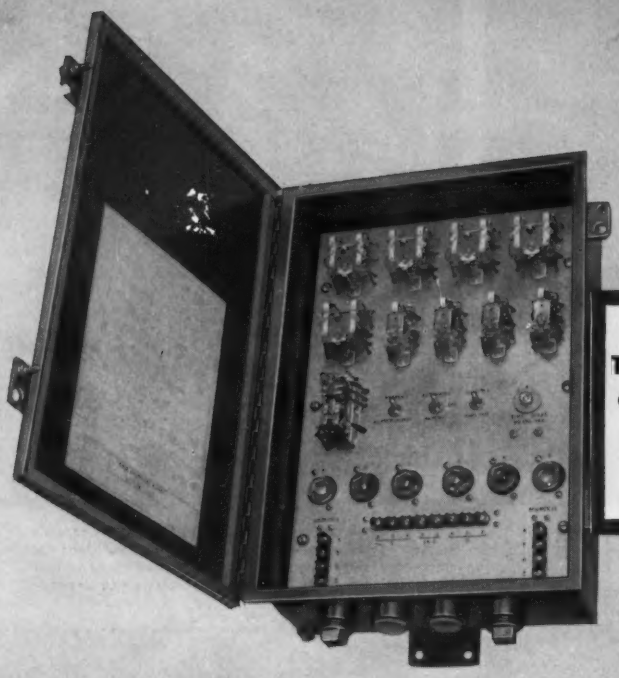
(a McGraw Electric Company Subsidiary) Macomb, Illinois

246

Distributed by **LINE MATERIAL**

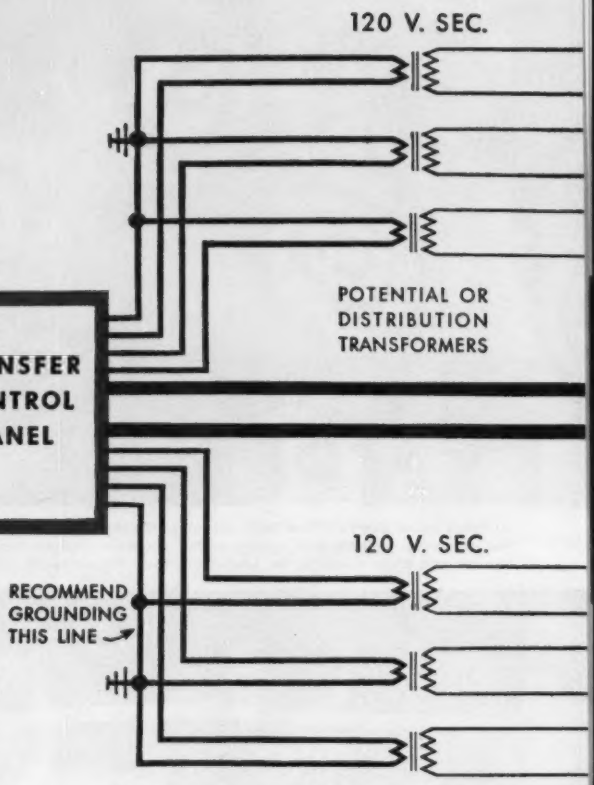
Electrical Porcelain Insulators

(a McGraw Electric Company Division)



TYPE S TRANSFER CONTROL

L-M's Type S automatic load transfer control is completely enclosed in weatherproof steel cabinet. It is designed to operate with L-M's single-phase Type NR switch, heavy-duty Type R three-phase recloser, or L-M's new three-phase heavy-duty Type VR switch.



NOTE: Control may also be furnished for single-phase sensing, is recommended if three-phase protection is provided in each feeder.

NOTE: For simplicity, protective equipment (fuses, lightning arresters, etc.) are not shown.

Automatic Load Transfer Control For 4-Wire Wye System—Three-Phase Sensing

The diagram above shows a typical load transfer scheme. Below is the operating sequence using L-M's new Type VR switch and Type S transfer control panel. This provides an economical and dependable method of assuring service continuity.

Operation of the Three-Phase Sensitive Control

1. Assume load is connected to Source I and potential on either phase A, B, or C is lost. If either X, Y or Z is not energized, no switching occurs. If X, Y & Z become or are all energized, VR on I opens and VR on II closes, after time delay, thus transferring load to other feeder.

2. Assume control is set for "Source I preferred," load is connected to II, and X, Y & Z are energized. If energy returns to A, B & C, VR on II opens and VR on I closes, after time delay.

Assume control is set for "no preference," load is connected to II, and X, Y & Z are energized. If A, B & C are energized, nothing happens. If X, Y or Z then loses potential, after time delay VR on II opens and VR on I closes.

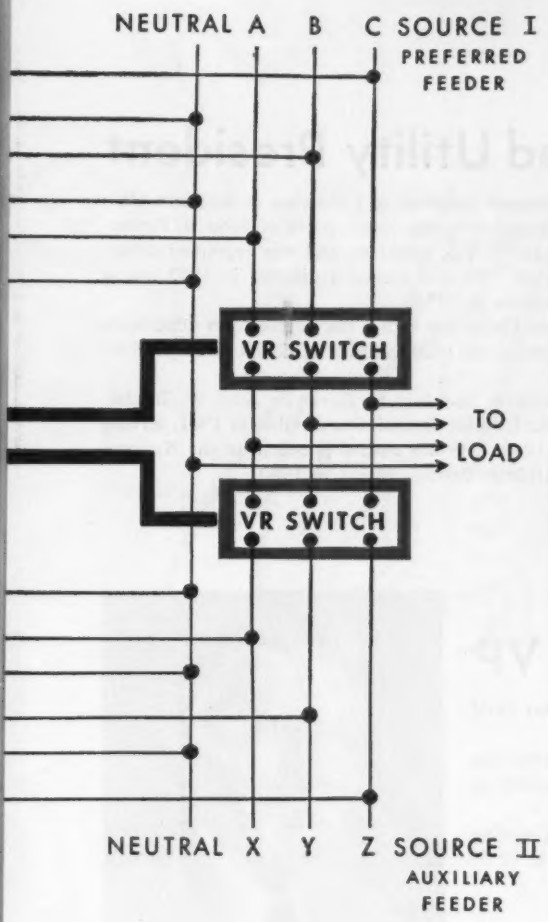
3. Control is sensitive to three-phase energy. It seeks to disconnect single- or two-phase service but will remain on the same source if the other source is not three-phase.

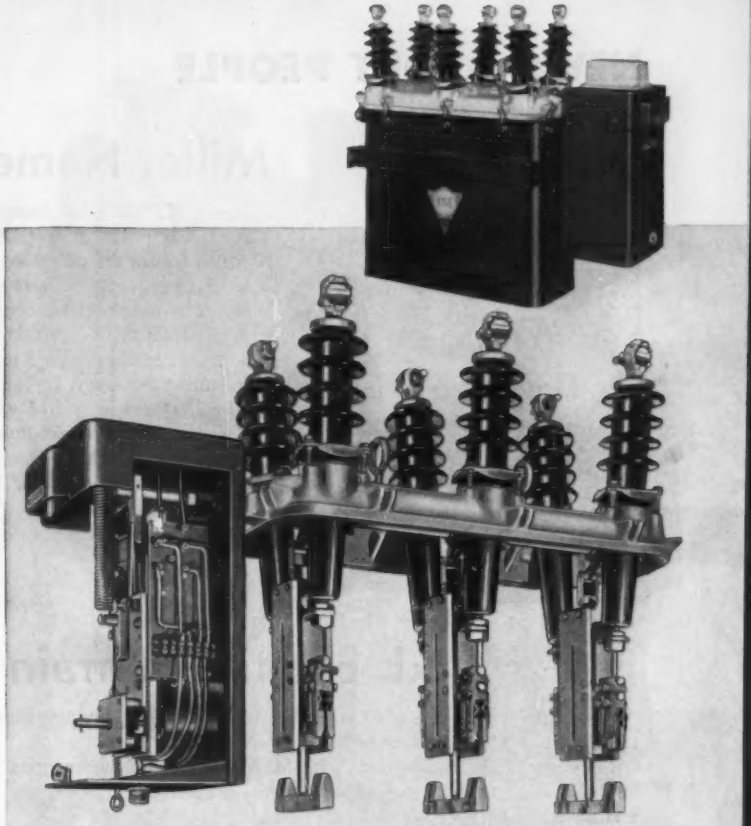
4. Electrical interlock insures that VR I is open before the other switch begins to close. This applies to both automatic and manual motoring operations.

5. Manual switches provided inside cabinet to transfer load to either source. Another switch selects "Source I preferred" or "no preference."

6. Time delay adjustable up to approximately one minute; longer delay (up to 5 min.) available on special order. Same delay, either direction of transfer. Delay should be set to prevent false operation on transient conditions.

LINE MATERIAL





VR SWITCH L-M's new heavy-duty Type VR switch is rated at 14.4 kv RMS, with a 110 kv BIL, a 20,000 ampere momentary rating and a 400 amp thermal rating. Simultaneous clearing of all phases in 3 cycles. Solenoid operates on 120 volt secondary, requires 1.5 amps to trip.

Automatic Switching...

L-M's New Load Transfer Equipment Assures Service Continuity To Important Loads

By **FRANK McSTAY**
Product Manager
Kyle Products
Line Material Company

Distribution systems are being called upon to be even more reliable in supplying power to important loads. Hospitals, radio and television stations, government and many industrial loads must have better service continuity.

L-M's new Type S automatic load transfer control and Type VR heavy-duty oil switch provide an excellent means for automatically switching important loads during feeder outages.

Automatic Load Transfer Control

The Type S control is a pre-assembled, pre-wired relay device which is completely enclosed in a weatherproof steel cabinet. It is quick and easy to install.

Adjustable time-delay relays are used in L-M's Type S controls to prevent false operation on transient conditions. An interlock mechanism in the control circuit permits load transfer to the auxiliary feeder only after the switch has disconnected the faulted feeder. The interlock is also arranged so that the Type S will transfer the load only when the auxiliary or standby feeder is energized.

The Type S control is extremely versatile. It will operate with L-M's single-phase 200 ampere Type NR switch, with the heavy-duty Type R three-phase recloser, or with L-M's new three-phase, heavy-duty Type VR switch. The type S can also be applied to automatic reclosing circuit breakers which have been slightly modified.

Heavy-Duty, Three-Phase Oil Switch

L-M's new remote control Type VR oil switch is a 14.4 kv 400 ampere heavy-duty switch, designed for capacitor switching, distribution feeder sectionalizing, and automatic load transfer applications. The Type VR has a 110 kv BIL with a 20,000 ampere momentary rating. The unit trips and clears all three phases simultaneously in three cycles.

An auxiliary switch is available with the VR or can be added in the field. It may be a one, two, three, or four stage unit, used for remote-position indicating or low-voltage-control switching of apparatus used in conjunction with the VR switch.

Get bulletins and complete information on new load transfer schemes and equipment from your L-M Field Engineer, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Kyle® Switchgear

Miller Named Utility President

Harry M. Miller has been elected president of Columbus & Southern Ohio Electric Co to fill the post left vacant by the recent death of John B. Poston.

Miller joined the utility in 1951 as vice president, and was appointed executive vice president the next year. He was named a director in 1953 and a member of the executive committee in 1954.

A graduate of Ohio Wesleyan University with a law degree from Ohio State University, Miller served 3 terms, from 1929 to 1935, as Gallia County (Ohio) Prosecuting Attorney.

In 1939 he was named executive secretary to Governor John W. Bricker and was appointed to the Public Utilities Commission of Ohio in 1941, serving as its chairman from 1947 to 1949. He was elected president of the National Association of Railroad and Utilities Commissioners in 1950.

H. M. MILLER

MP&L Elects Fountain VP

Mississippi Power & Light Co has elected Joseph B. Fountain, former chief engineer, as a vice president of the utility.

Fountain has been associated with MP&L since 1928, when upon receiving an engineering degree from Mississippi State College, he joined the utility as a student engineer.

During his 27 years with MP&L he has held various posts in the engineering section, and when the section was established as a separate department in 1953, Fountain was designated to head its operations.

He has served as chief engineer of the utility since 1947.

J. B. FOUNTAIN

Ebasco Elects Reece Executive VP, Ups Wilkins, Colquhoun

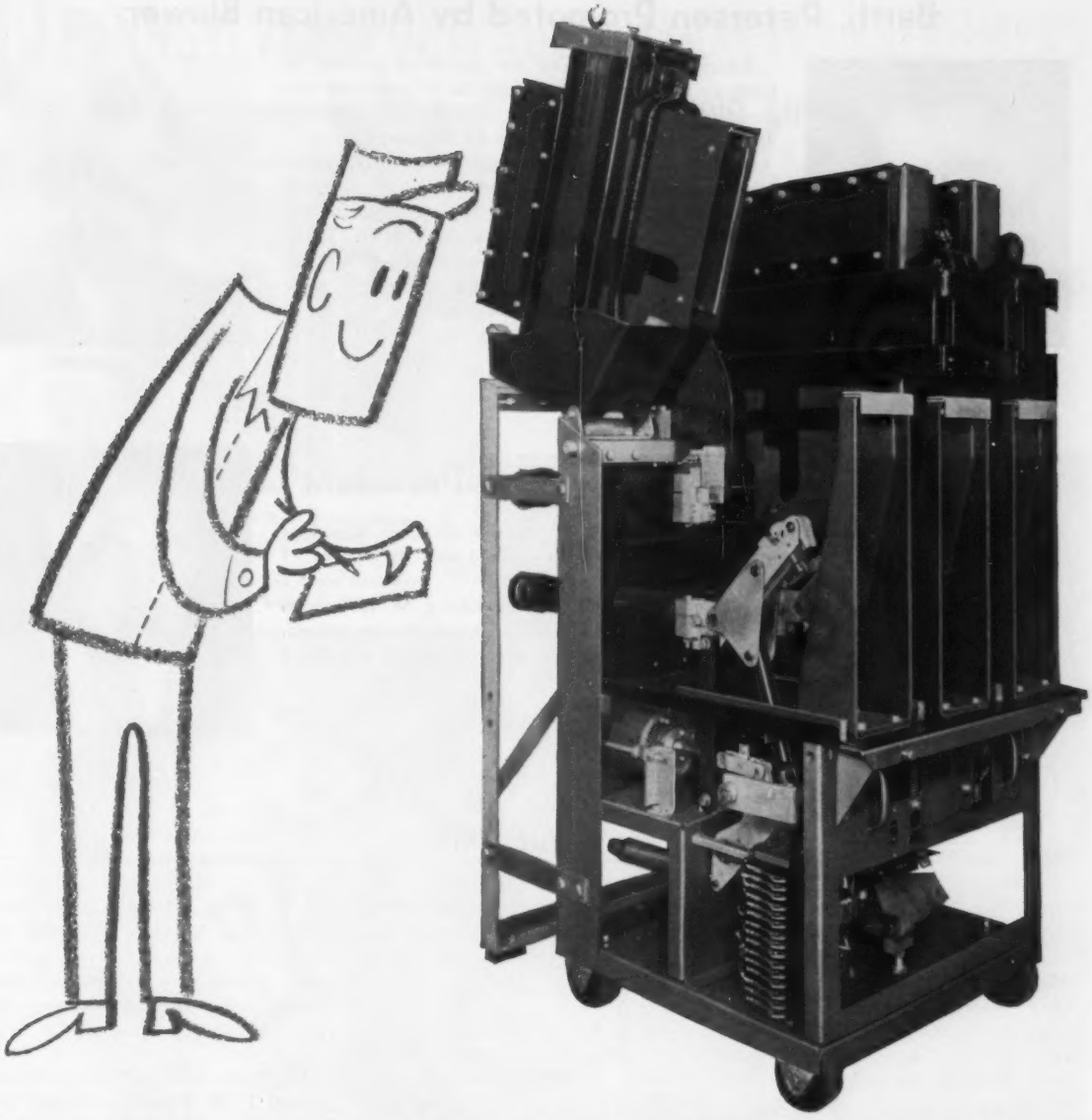
New executive vice president of Ebasco Services, Inc, is K. W. Reece, vice president in charge of engineering and construction since 1952. Also elected were E. K. Wilkins as vice president in charge of construction and W. H. Colquhoun as vice president in charge of engineering.

Reece began his Ebasco career in 1925, and has since held various positions with the firm, including resident engineer, construction engineer, construction superintendent of engineering and construction projects, and general engineer. In 1939 he was named head of the appraisal department, and six years later became assistant to vice president of engineering and construction. He was made engineering manager in 1946.

Wilkins, general construction manager since 1953, has been with the organization since 1922. Previous to his 1944 appointment as construction manager, he had served as field engineer, resident engineer, and construction superintendent of public utility and industrial construction in Pennsylvania, Florida, Texas, Panama, Mexico, and China.

Colquhoun joined Ebasco in 1941, and since that time his assignments have included engineering and economic studies; assistant superintendent of design; chief coordinator covering engineering, construction, and purchasing; and assistant to the engineering manager in charge of utility design, engineering, and construction. He has been engineering manager since 1952.

K. W. REECE E. K. WILKINS W. H. COLQUHOUN



SEE VALUE HERE YOU'LL SEE NOWHERE ELSE

Operating engineers in the electrical industry often say you can see the higher quality in I-T-E switchgear even when you stand 'way back.

Of course, they're only partly right. You can easily see the practical component arrangement, the all-welded steel construction with compartments designed to retain shape even when lifted as a unit, and the clean, neat appearance. These are standard on all I-T-E switchgear.

But we want you to look closer—see even more. For example, in Metal-Clad Switchgear: the easy-to-service horizontal drawout design; the tilting arc chutes; the extra-heavy insulation. There's quality in every detail—quality that means dollars' more value for your switchgear investment and years' longer troublefree service.

Why not phone the I-T-E office nearest you. Or write for bulletin 7004 giving a complete description of 5, 7.5 and 15 kv switchgear. I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Phila. 30, Pa.

I-T-E

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

Barth, Petersen Promoted by American Blower

H. E. BARTH

American Blower Corp has appointed Herbert E. Barth to the newly created position of executive vice president. Erwin W. Petersen, sales manager, succeeds Barth as vice president of sales for the company.

Barth, vice president of sales since 1937, joined American Blower as an engineer in 1915 following graduation from the University of Kentucky. He entered sales work for the company a year later.

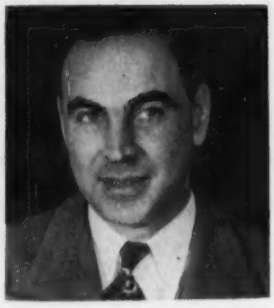
Before his appointment as sales manager in 1952, Petersen served in various sales and management posts. He started with American Blower as sales engineer in 1923 upon graduation from Iowa State.

E. W. PETERSEN

Rogoff Appointed Burndy Vice President

Burndy Engineering Co has announced the appointment of Julian Rogoff as vice president of the firm. Rogoff, who has been associated with Burndy for 25 years, was formerly chief engineer.

Other executive appointments include the election of Stanley M. Loomis as treasurer, and Walter L. Kaplow as controller. Loomis, a 10-year Burndy veteran, is former controller, and Kaplow joins the company after serving as a certified New York State accountant for 19 years.



J. ROGOFF

PERSONAL BRIEFS

R. H. Engels has been appointed by Northern States Power Co as assistant to **Allen S. King,** president. **W. N. Marx,** manager of NSP's Southwestern Division, replaces Engels as Sioux Falls Division manager, and **J. J. Carroll** of the company's general office in Minneapolis succeeds Marx.

Herbert K. Jorris has been appointed assistant to the president of Toledo Edison Co, succeeding **Augustus M. Lynch,** who died in November. Jorris, manager of appliance sales until the utility withdrew from that field recently, has been executive assistant.

Delaware Power & Light Co has appointed **R. B. Richardson,** operating manager, as assistant vice president in charge of operations, and **Fred T. Bear,** former manager of engineering, assistant vice president in charge of engineering. Both will assist **Frank P. Hyer,** vice president of operations, engineering, and construction. **Harold W. Clift,** assistant operating manager-gas, has been named manager of gas operations; and **Raymond K. Grubb,** assistant operating manager-electric, becomes manager of electric operations.

American Standards Association has elected **H. Thomas Hallowell, Jr,** president of Standard Pressed Steel Co, as president for the coming year, with Van H. Leichliter, vice president of operations of American Steel and Wire Division of United States Steel Corp, as vice president.

Columbus & Southern Ohio Electric Co has named **G. C. Shafer,** assistant secretary and assistant treasurer, to succeed **John A. Niles** as secretary, effective Feb. 1. Niles retires after 40 years service.

Kennecott Copper Corp has appointed **L. W. Shelton,** assistant general purchasing agent, as general purchasing agent to succeed **R. Park Lamborn** who reached retirement age Jan. 1. Lamborn continues with the company in an advisory capacity.

Asa H. Myles, former assistant chief engineer of Electric Controller & Manufacturing Co, has been named chief engineer and member of the operating committee of the company, now a division of Square D Co.

F. D. Weatherholt has been named to succeed **L. R. Botsai** as manager of Westinghouse Electric Corp's Gearing Division. Botsai has been appointed assistant to Vice President **A. C. Monteith.**

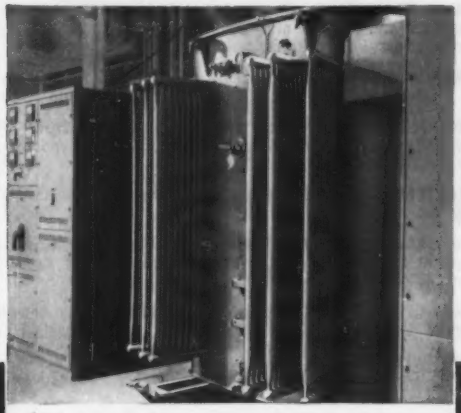
OBITUARY

Ernest C. Hathaway, 60, director of industrial development for Central Vermont Public Service Corp, and former president of Vermont Society of Engineers, died recently in Rutland, Vt.

Mrs. Mary McKaig Taft, president of Greenville (N. H.) Electric Lighting Co since the death of her husband in 1947, died at Winter Park, Fla.

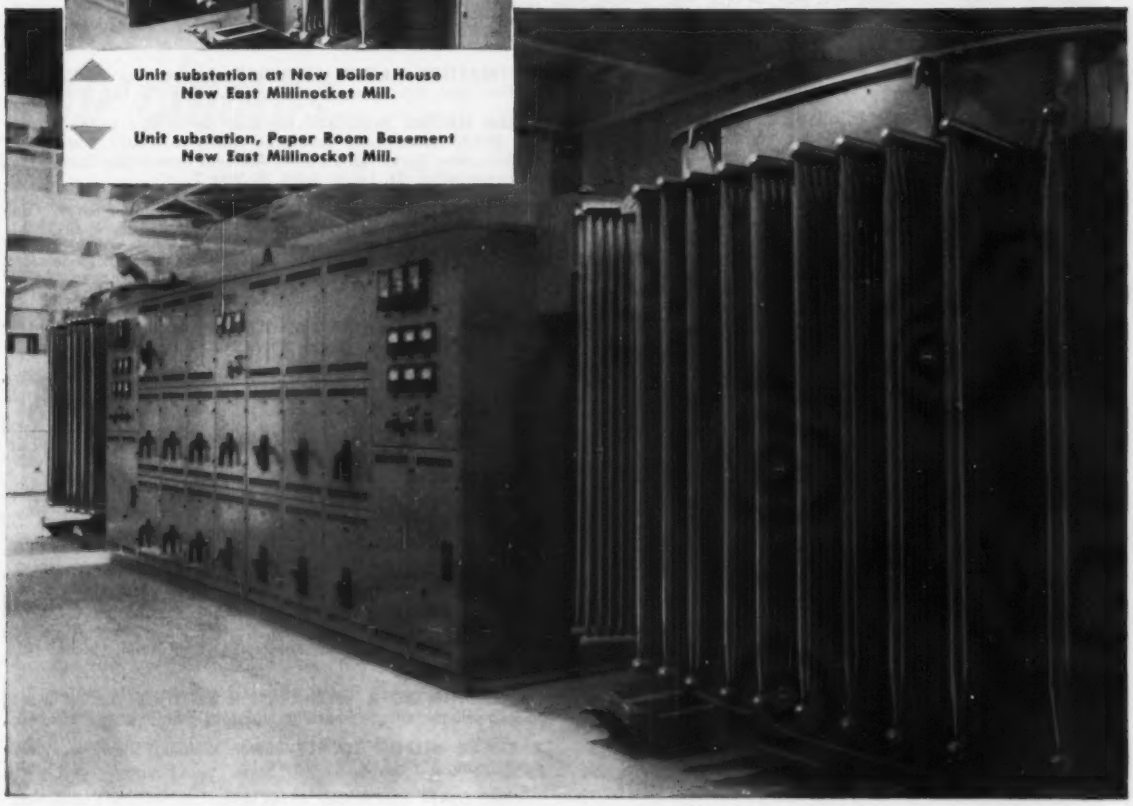
10 PENNSYLVANIA UNIT SUBSTATION TRANSFORMERS

help supply the power requirements of Great Northern Paper Company's East Millinocket Plant



▲ Unit substation at New Boiler House New East Millinocket Mill.

▼ Unit substation, Paper Room Basement New East Millinocket Mill.



Seven 2000 Kva and three 1000 Kva Pennsylvania Askarel transformers are supplying power to all of the 550-volt motors used by Great Northern Paper Company in the manufacture of paper at its new Millinocket plant. Protected by Askarel, Pennsylvania's non-inflammable cooling and insulating liquid, these transformers are important components of I-T-E unit substations. They assure an uninterrupted flow of power from the 69,000-volt power system to the 575Y/332-volt distribution system. All transformers are 3 phase, 55°C. temperature rise and operate at 40 cycles.

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division

CANONSBURG, PENNSYLVANIA • ***Greater Pittsburgh District*** • **Telephone: SHerwood 5-9100**

MEETINGS CALENDAR

JANUARY

***EDISON ELECTRIC INSTITUTE**—Prime Movers Committee, Warwick Hotel, Philadelphia, Pa., Jan. 30-Feb. 1.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Winter General Meeting, Hotel Statler, New York, Jan. 30-Feb. 3.

FEBRUARY

***ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM**—West North Central Region, Schroeder Hotel, Milwaukee, Wis., Feb. 2; Inter-Regional Committee, Blackstone Hotel, Chicago, Ill., Feb. 9; Workshop Conference Committee, Blackstone Hotel, Feb. 10.

EDISON ELECTRIC INSTITUTE—Conference Planning, sponsored jointly with AGA, William Penn Hotel, Pittsburgh, Pa., Feb. 2-3; Commercial Electric Space & Air Conditioning Committee, Atlanta, Feb. 6-7; Industrial Power & Heating Group, Netherland Plaza Hotel, Cincinnati, Feb. 7-8; Transmission & Distribution Committee, Warwick Hotel, Philadelphia, Pa., Feb. 7-8; Electrical Equipment Committee, Homestead, Hot Springs, Va., Feb. 13-14; Commercial Lighting Committee, Hotel Shoreham, Washington, D. C., Feb. 15-16; Residential Promotion Committee, New York, Feb. 16-17; Commercial Cooking & Water Heating Committee, The Atlantic-Biltmore Hotel, Atlanta, Feb. 16-17; Meter & Service Committee, Hotel Cleveland, Cleveland, Ohio, Feb. 20-22.

GREAT LAKES POWER CLUB—LaSalle Hotel, Chicago, Ill., Feb. 2-3.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 2-3.

PENNSYLVANIA ELECTRIC ASSOCIATION—Transmission & Distribution Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Feb. 2-3; Relay Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Feb. 9-10; Electrical Equipment Committee, Penn Harris Hotel, Harrisburg, Pa., Feb. 9-10; Communications Committee (Winter Meeting), Adelphia Hotel, Philadelphia, Pa., Feb. 13-14; Systems Operation Committee, Hotel Statler, New York, Feb. 16-17; System Planning Committee (Winter Meeting), Hotel Roosevelt, Pittsburgh, Pa., Feb. 20-21.

INDUSTRIAL ELECTRIFICATION COUNCIL—National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 6-10.

SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, Buena Vista Hotel, Biloxi, Miss., Feb. 9-10.

AMERICAN SOCIETY OF CIVIL ENGINEERS—National Winter Convention, Dallas, Tex., Feb. 13-17.

***AMERICAN MANAGEMENT ASSOCIATION**—Midwinter Personnel Conference, Palmer House, Chicago, Ill., Feb. 15-17; 2nd Annual Electronics Conference & Exhibit, Hotel Commodore, New York, Feb. 27-29.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS—Annual Spring Meeting, Mayflower Hotel, Washington, D. C., Feb. 17-18.

ROCHESTER ELECTRICAL EXPOSITION—War Memorial Building, Rochester, N. Y., Feb. 18-25.

NATIONAL ADEQUATE WIRING BUREAU—12th Annual Conference, LaSalle Hotel, Chicago, Ill., Feb. 23-24.

AMERICAN SOCIETY FOR TESTING MATERIALS—Committee Week, Hotel Statler, Buffalo, N. Y., Feb. 27-March 2.

MARCH

SOUTHERN SAFETY CONFERENCE, INC.—Southern Safety Conference & Exposition, Hotel Biltmore, Atlanta, Ga., March 4-6.

SOUTHEASTERN ELECTRIC EXCHANGE—23rd Annual Conference, Boca Raton, Fla., March 12-14.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—12th Annual Conference, Hotel Statler, New York, March 12-16.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Edgewater Beach Hotel, Chicago, Ill., March 12-16.

***EDISON ELECTRIC INSTITUTE**—Industrial Relations Committee, Muehlebach Hotel, Kansas City, Mo., March 15-16; Street Lighting Committee, Minneapolis, March 23-24; 22nd Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 26-29.

APRIL

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—South West District Meeting, Baker Hotel, Dallas, Tex., April 2-4; Great Lakes District, Fort Wayne, Ind., April 16-18.

***INDIANA ELECTRIC ASSOCIATION**—16th Annual Young Men's Utility Conference, Hotel Van Orman, Fort Wayne, Ind., April 4-5.

ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION—8th National Biennial Electric Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

***MARYLAND UTILITIES ASSOCIATION**—Annual Business Conference, Lord Baltimore Hotel, Baltimore, Md., April 6.

MIDWEST RESEARCH INSTITUTE—Symposium for Management on Applications of Analog Computers, University of Kansas City, Kansas City, Mo., April 10-11.

POINT OF PURCHASE ADVERTISING INSTITUTE—10th Annual Symposium & Exhibit, Hotel Sheraton Astor, N. Y., April 10-12.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Engineering & Operation Section, Hotel Vancouver, Vancouver, B. C., April 11-13.

SOUTHEASTERN ELECTRIC EXCHANGE—Engineering & Operation Section, Bon Air Hotel, Augusta, Ga., April 12-13.

EDISON ELECTRIC INSTITUTE—National Conference of Electric & Gas Utility Accountants, sponsored jointly with AGA, Hotel Commodore, New York, April 16-18; Accident Prevention Committee, Sheraton Hotel, St. Louis, April 30-May 2.

GREATER NEW YORK SAFETY COUNCIL—26th Annual Safety Convention & Exposition, Hotel Statler, New York City, April 16-20.

PACIFIC COAST ELECTRICAL ASSOCIATION—Administrative Services Section Meeting, Huntington-Sheraton Hotel, Pasadena, Calif., April 18-19.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Engineering Conference, Hotel President, Kansas City, Mo., April 18-20.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Conference on Recording & Controlling Instruments, Bradford Hotel, Boston, April 26-27.

MAY

NATIONAL FARM ELECTRIFICATION CONFERENCE—LaSalle Hotel, Chicago, Ill., May 1-2.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—North Eastern District Meeting, Rochester, New York, May 2-4.

***EDISON ELECTRIC INSTITUTE**—Accident Prevention Committee, Sheraton Hotel, St. Louis, Mo., May 2-4; Purchasing & Stores Committee, Sheraton Plaza Hotel, Boston, Mass., May 7-9; Commercial Electric Cooking Conference, Sheraton Hotel, Chicago, Ill., May 8.

AIR-CONDITIONING & REFRIGERATION INSTITUTE—Annual Meeting, The Homestead, Hot Springs, Va., May 7-9.

AMERICAN WELDING SOCIETY—Fourth Welding Show, Memorial Auditorium, Buffalo, N. Y., May 9-11.

PACIFIC COAST ELECTRICAL ASSOCIATION—Annual Convention, Las Vegas, Nevada, May 14-16.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Design Engineers—Design Engineering Conference, Convention Hall, Philadelphia, Pa., May 14-17.

PENNSYLVANIA ELECTRIC ASSOCIATION—Relay and Electrical Equipment Committees, Hotel Roosevelt, Pittsburgh, May 17-18.

***INDUSTRIAL HEATING EQUIPMENT ASSOCIATION, INC.**—Spring Meeting, The Homestead, Hot Springs, Va., May 20-23.

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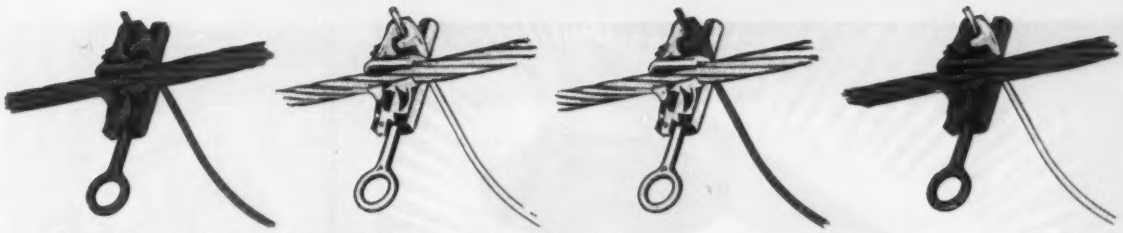
* Additions this week

OTHER EVENTS OF INTEREST

NATIONAL ELECTRICAL WEEK—Week of Feb. 5.

"LIVE BETTER . . . ELECTRICALLY"—Closed circuit telecast, Feb. 8.



COPPER TO COPPER | ALUMINUM TO ALUMINUM | ALUMINUM TO COPPER | COPPER TO ALUMINUM

You can tap all these with AGP* tap clamps

Chance AGP Clamps, approved by power company after power company on the basis of their own tests, can be used for all types of connections: copper to copper, copper to aluminum, aluminum to aluminum, and aluminum to copper.

Chance FORTIFIED cadmium coating, applied .001" thick to the aluminum body of the clamp, resists corrosion and electrolysis in all types of connections. This high density FORTIFIED cadmium coating gives extra long life protection to both the clamp and the conductor.

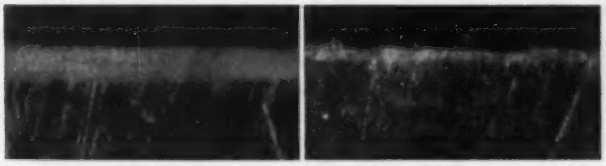
AGP tap clamps have the advantage of light weight which lengthens conductor life by minimizing the effects of vibration and makes them easy to handle on a clamp stick . . . plus easy identification with the RED EYE SCREW—plus their most important feature, their versatility. You can reduce your inventory and simplify your stocks by standardizing on AGP.

CHANCE PERMA-GRIP TAP CLAMPS

Here's a service-proved tap clamp for all general applications. Gripping jaws of this clamp make a three-point contact with conductor.

CHANCE "P. C." (PROTECTED CONNECTION) CLAMPS

Complete thread protection for easy installation and removal. No threads are ever exposed except in the extreme opened position. Wide jaws contact all strands.



Micro-photo above compares Chance A.G.P. fortified cadmium coating (left) to commercial plating, one reason for A.G.P.'s success.

*Aluminum General Purpose

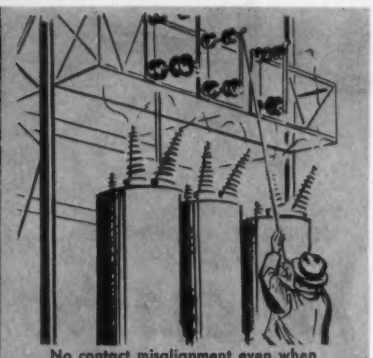
ABC INDUSTRIES

CC56-4

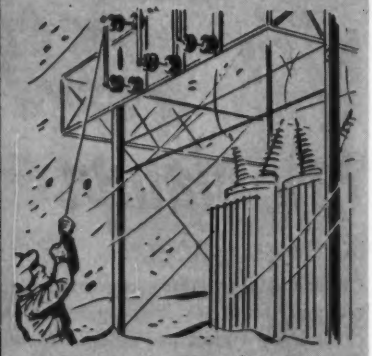
A·B·CHANCE CO·

CENTRALIA, MISSOURI

San Francisco, California • Pittsburgh, Pennsylvania



No contact misalignment even when switch is operated from the side.



Easy operation even under severe atmospheric conditions.

How to judge the merits of

DELTA-STAR Hook Operated B-2K Disconnects

Consider each advantage offered by B-2K Outdoor Disconnect Switches in light of your specific needs. One or two advantages may stand out—or all may be equally important to you.

You are assured of *long service life* because of rugged, rigid construction, with flared or split tubular blades. This rugged construction also *prevents contact misalignment* even when operator must stand to one side to open or close the switch. *Easy operation at all times* results from efficient blade pryout and lock assembly, with large 3 in. diameter hook ring. The B-2K features *efficient heat dissipation* because ample material is used throughout. Contact pressure-applying springs carry no current, and offer large deflection to *maintain uniform high pressure* contact over extended periods of use.

Delta-Star B-2K Disconnects are available in three ampere ratings—1200, 600 and 400—and in voltage ratings from 7.2 kv to 161 kv. They meet your requirements in every respect.

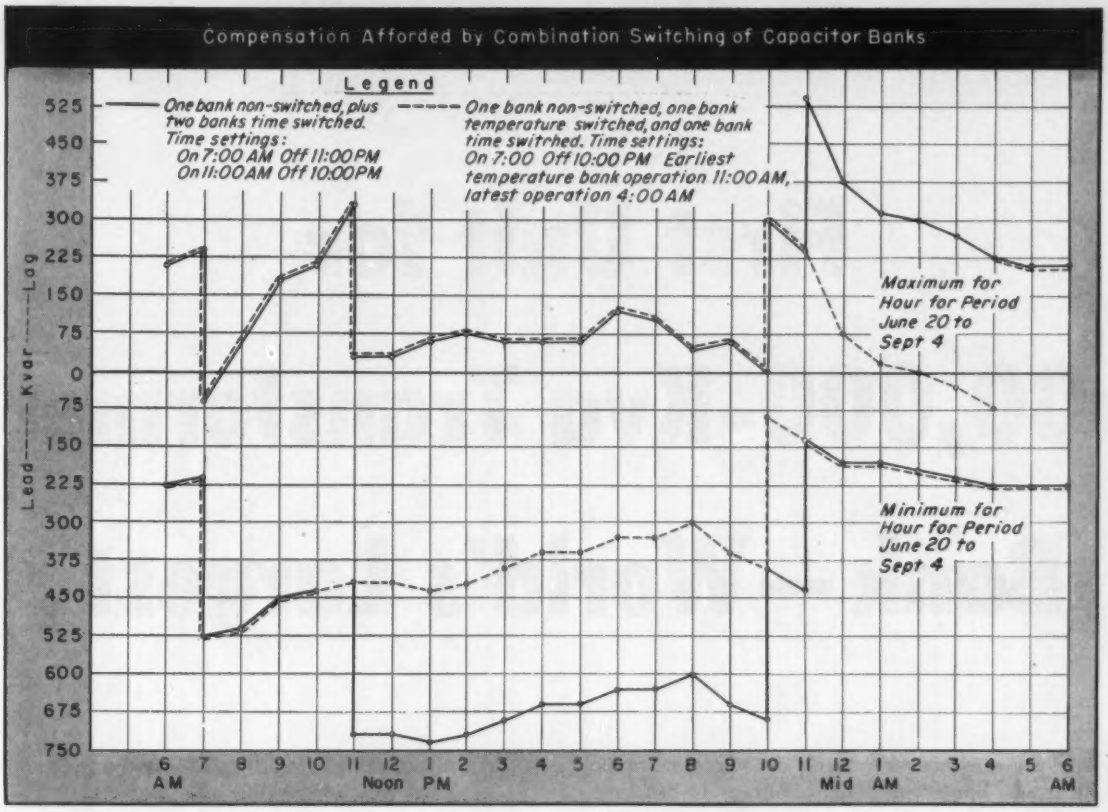
Write for new B-2K Disconnect Switch Catalog or ask your nearby Delta-Star representative for your copy.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

2437 Fulton Street • Chicago 12, Illinois

District Offices in Principal Cities


Compensation Afforded by Combination Switching of Capacitor Banks
Legend
One bank non-switched, plus two banks time switched. Time settings: On 7:00 AM Off 11:00 PM On 11:00 AM Off 10:00 PM
One bank non-switched, one bank temperature switched, and one bank time switched. Time settings: On 7:00 Off 10:00 PM Earliest temperature bank operation 11:00 AM, latest operation 4:00 AM
Maximum for Hour for Period June 20 to Sept 4
Minimum for Hour for Period June 20 to Sept 4
Lead ---- Kvar ---- Lag
525 450 375 300 225 150 75 0 75 150 225 300 375 450 525 600 675 750
6 AM 7 8 9 10 11 12 Noon 1 PM 2 3 4 5 6 7 8 9 10 11 12 Mid 1 AM 2 3 4 5 6 AM

COMBINATION CONTROL of capacitors (dotted curves) affords a closer approximation to unity power factor than time switch control alone (solid curves). Curves plot maximum and minimum values for particular hour over 3-month tests

Combination Switching Fits Var Load

DISTRIBUTION
Operation

Oklahoma utility devises capacitor control combining time and thermal switching responsive to changes in indoor temperature

A. R. MILLIKEN, Distribution Engineer, Public Service Co of Oklahoma, Tulsa, Okla.

Temperature control in conjunction with time-switched capacitors affords better compensation than time-switched capacitors alone. But time control must follow the indoor house temperature pattern and thereby also the pattern of var load response to air conditioning equipment operation.

These findings were made on the Tulsa distribution system by Public Service Co of Oklahoma in experiments to find control equipment sensitive to the inside house temperature pattern. As temperature switching is comparable in cost with time switching, the utility's interest centered on better performance. Factors peculiar to temperature switching were found to be these:

1. Temperature-switched capacitors can be applied only to feeders having a large component of temperature-influenced load. Residential and mixed residential and commercial feeders have such loads, but industrial feeders do not.

2. The temperature setting must be one at which temperature influence becomes large.

3. A definite ratio of temperature-switched to time- and seasonally-switched banks gives the optimum arrangement.

Temperature-switched units composing 25% of total feeder capacitors appeared at the start to be a practicable proportion and subsequently proved satisfactory. Thus an average feeder may have two seasonally switched banks of 300 kvar each, and one time-switched and one temperature-switched bank of 300 kvar each. Seasonal control is by manual switching.

Capacitor control becomes a problem when reactive compensation is high. On an occasional cool summer day reactive load falls sharply. There is a similar drop in early spring before seasonally controlled capacitors

(*Continued on page* 46)

Super power transformers pace utility expansion

First Unit for 600,000-Kva Transformer Bank—World's Largest

THIS is a 200,000-kva single-phase power transformer, one of six Allis-Chalmers is building for a western transmission line. When the first three of these giant units are installed early next year, they will form the highest rated bank of power transformers anywhere. Together they will handle 600,000 kva, almost double the capacity of any three-phase unit or single-phase combination of units previously manufactured.

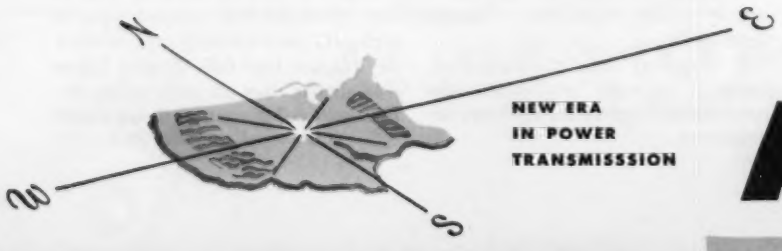
Techniques used in designing and building these transformers resulted from the completion two years ago of the highest voltage power transformer ever built. The experimental unit, a 600,000-volt power transformer, was built by Allis-Chalmers to prove out techniques far beyond the nation's utility needs for the foreseeable future.

These enormous units are examples of Allis-Chalmers leadership in helping power systems all over the country meet vastly increasing demands for power. Here are some of the features of this transformer worth noting:

- It is corona-free. Allis-Chalmers pioneered the design of corona-free transformers. As a result, regardless of a unit's size and number of parts, insulation damage caused by the creeping effect of corona will never shorten a transformer's useful operating life. Tests that proved this transformer included Allis-Chalmers new switching surge test at 930,000 volts.
- It is a triple rated unit, OA/FA/FA, with two sets of fans. Its ratings are 120,000 kva self-cooled, 160,000 kva with the first set of fans, and 200,000 kva with a second set of fans. As load builds up, fans can be switched on to provide cooling sufficient to handle the larger capacities.
- Allis-Chalmers developed welding techniques to make possible use of heavy plate aluminum in transformer core and coil construction. As a result, the unit is lighter in weight and is easier to ship and install.

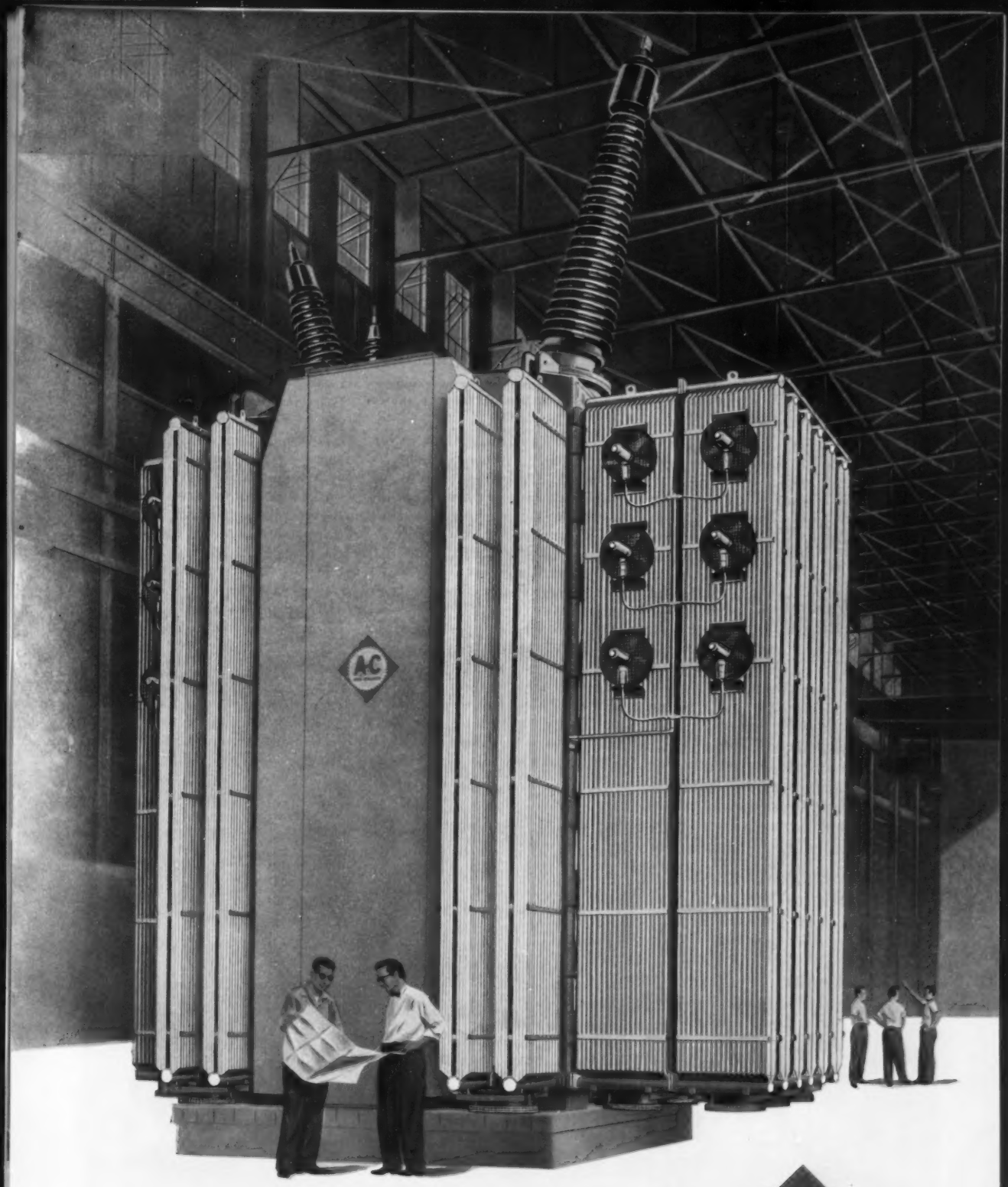
An Allis-Chalmers representative will be glad to discuss transformer developments with you at your convenience. Call the nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4867



NEW ERA
IN POWER
TRANSMISSSION

ALLIS-

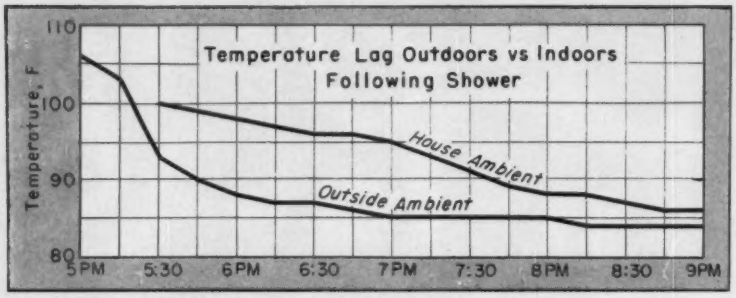


CHALMERS

A-C
ALLIS-CHALMERS

Combination Switching Fits Var Load

(*Continued from page* 43)



TEMPERATURE CHANGES inside a house lag outside ambient temperature changes, as shown by these curves, following a sudden cool spell brought on by a shower

have been switched on and also after they were switched off in late fall.

For several years the relationship of temperature to reactive load had been observed on the Tulsa system. Extensive research furnished data for quantitative correlation of these factors. The company found that whenever outdoor temperature rose above that established by home heating practice, residential reactive load readings followed a well-defined curve with relation to mean outdoor ambient.

A pilot bank, put in service in the spring of 1954, helped to determine whether this relationship has practical use in switching capacitors. This new information led to temperature switching of 35 feeder banks of 300 kvar each, a 10,500-kvar total during 1955. In developing the switching arrangement, factors considered were:

1. Cost.
2. Availability of components.
3. Maintenance cost.
4. Favorable overall operating arrangement.

The problem was approached with a view to developing in the control switch a thermal analogy of an actual residence. If this could be done, satisfactory performance could be expected from setting on and off temperatures where a householder would be inclined to switch his room cooler.

Time Lag a Problem

Designing the switching arrangement involved difficulties. House and outside ambient temperatures are separated by a time lag, both on ascent and descent. Unless this time lag is provided for in the switch, banks switch off prematurely following a sudden decline in outdoor ambient.

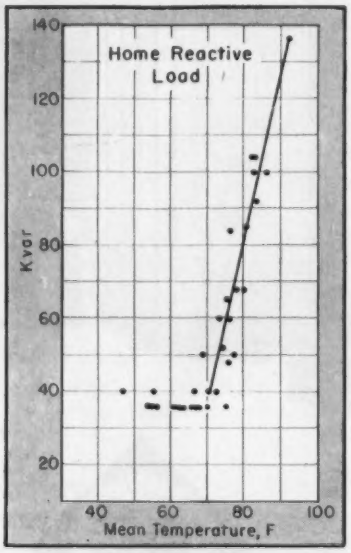
Another problem was how to minimize the effect of radiant heat which causes a switch to come on prematurely on a sunny day when the air is relatively cool. Painting an ordinary aluminum meter box with Plasticool paint cut radiant heat absorption satisfactory. The boxes also were equipped with two louvres, one replacing the usual glass and the other in the bottom to permit air circulation through the box. Thermal lag was overcome by immersing the switches in a suitable liquid.

Two single-pole, single-throw switches, rated 10 amp at 125 v, are components in each temperature switch. These control oil circuit reclosers for capacitor switching. One closes contacts on temperature rise, the other on temperature drop. Thus these switches put the bank on and take it off at temperatures represented by the switch settings. Banks in service in Tulsa during 1955 had switch settings of "on" at 90F and "off" at 85F. Thermal lag, however, delays both operations ordinarily for some 45 min after the outside ambient reaches these temperatures.

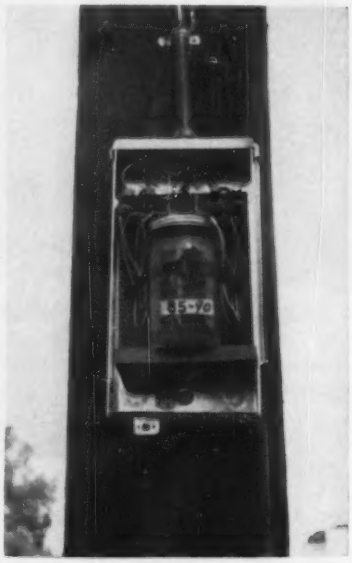
To establish the correspondence between switching at the chosen temperature settings and the reactive load, the author had switches set at these values installed at his home. Each switch had a recording meter, and the time of each switch operation was recorded daily from June 20 to Sept. 4. These times were compared with those on var charts of various feeders as the switches themselves have a little tolerance. From the daily observations and reactive values from a typical group of residential customers the compensation curves were plotted (See page 43).

These curves give the degree of compensation afforded by the two control combinations under extreme conditions.

Taking zero reactive as the reference of perfect compensation, the combination including a temperature switch stays closer to zero than that including two time switches.



HOME REACTIVE LOAD follows curve with relation to outdoor temperature



TEMPERATURE LAG was introduced into thermal control by immersing switch

ANOTHER REASON WHY UTILITIES EXPECT MORE FROM POWERS-AMERICAN AERIAL EQUIPMENT

POWERS American

Sky-Master®

HYDRAULIC AERIAL BEAM

For Placing Workmen in "HARD-TO-REACH PLACES"

UP · OUT · OVER · DOWN

Getting to out-of-the-way, hard-to-reach working areas is a breeze with Sky-Master. Twin, insulated work baskets carry workmen up, out, over, or down . . . provide on-the-ground comfort that speeds up overhead work.

Sky-Master—with accessory equipment for your job—can be furnished on a Powers-American Body that fits your exact requirements. Literature and prices on Sky-Master—in a size for reaching 42′ or 48′ above ground—will be sent on request.

Powers-American Division

McCABE-POWERS AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO. 625 CEDAR STREET • BERKELEY 10, CALIF.

VISITOR to Nine Mile Point Plant of Louisiana Power & Light Co stops car at gate and telephones plant office. After observing him on television screen, secretary either admits him or gives him other instructions

TV Guards Power Plant Gate

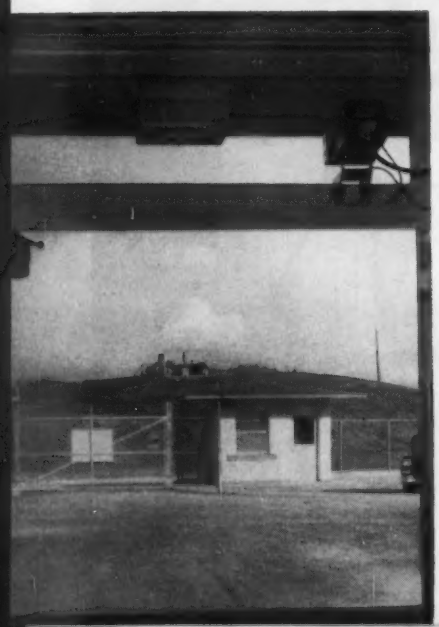
Industrial television has been adapted by the utility industry for a number of uses. TV cameras relay to control engineers the readings on boiler indicators, observe the condition of boiler fires, keep an eye on stack emissions. And now the tireless "eye" of the TV camera is being used to guard the entrance to a generating plant.

Louisiana Power & Light Co has installed the television mechanism at its Nine Mile Point generating station to scan visitors at the entrance.

The TV "gateman" permits an office employee to double as gate custodian. Through a direct telephone link she can talk to visitors as she observes them on her TV screen. Four buttons on her desk give her control of the operation of the gate.

Most of the people coming to the plant are company employees and known to plant officials. In the case of strangers who arrive unheralded, an official walks the few feet to the gate to conduct a personal interview, thus removing the impersonal quality that would otherwise prevail if the stranger were spoken to by telephone only and observed on the TV screen.

LP&L has found the installation a valuable time and money saver.

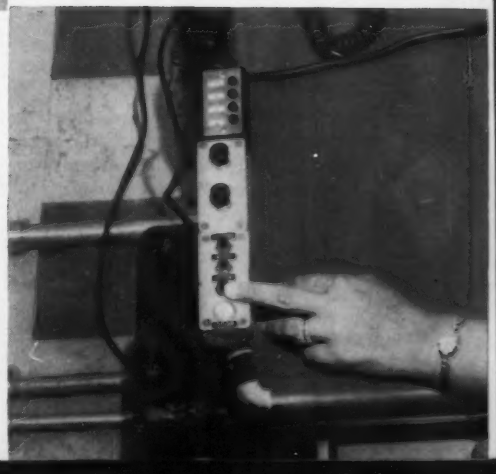


TELEVISION camera, mounted in box at upper right of office building doorway, takes in everything which occurs at the gate to plant

EACH VISITOR, coming or going, must be identified. Identity is given by direct phone link with the office

for Louisiana Power & Light Co

FROM HER DESK secretary talks to and observes visitor on TV screen. From here she has control of gate



PUSH BUTTONS on the desk of secretary, control operation of the gate. If visitor is unknown, plant official meets him at the gate

INDUSTRIAL RELATIONS

Like Father, Like Son

A father, treasurer for the Salt River Project Agricultural Improvement & Power District, Phoenix, Ariz., was able to present his son, who is working for the same District with a journeyman certificate at graduation ceremonies held for eight other District employees recently.

Seth G. Bazzill, left, treasurer, is shown with his son, Seth C. Bazzill who is a relayman in the meter shop of the District.

The other graduates who received certificates were: Earl J. Smith, auto mechanic; John L. Sims, electrician; Marvin Delk, lineman; Louis Q. Thomas, electrician, Jesus P. Felix, lineman; Allen M. Willard, machinist; Eldred Broeder, lineman; and Clay Bates, lineman.

The graduates to qualify for the certificates had to complete three and four-year courses of theory and practice and on-the-job training under the rules set by the Arizona Apprenticeship Council. Since 1947 when the apprenticeship program was begun, 52 apprentices have been graduated; and 30 of these are still employed by the District.

BC Power Commission—IBEW Sign 2-Year Pact

A new, two-year agreement effective on Jan. 1 has been signed between International Brotherhood of Electrical Workers and British Columbia Power Commission.

The agreement, affecting some 350 commission employees in 25 classifications, covers locals on Vancouver Island, Vernon, and Kamloops.

The main changes in the agreement are:

1. Sick leave of one week per year becomes cumulative. (Unused sick leave can be used in subsequent years if needed or can still go toward earlier retirement.)

2. All employees under the agreement will now work a 40-hour week. (Previously, certain workers in smaller districts worked a 44-hour week.)

3. Hourly rates of pay were set for all tradesmen, including plant operators previously paid on a monthly basis. All were adjusted in relationship to the base rate of journeymen linemen.

4. Employees will receive a 2% increase effective Jan. 1, 1957.

5. Several other minor changes were made in the mutual interest of the parties to the agreement.

TVA Increases Wages 7½¢ to 15¢ an Hour

The Tennesee Valley Authority gave 5,000 construction workers wage boosts ranging from 7½¢ to 15¢ an hour, effective Dec. 31.

In addition, TVA granted $180 to $250 yearly increases to another 5,000 maintenance and operating employees hired on an annual basis. The effective date was Jan. 1.

The hourly scale now ranges from $1.52½ for laborers to $3.27½ for bricklayers. New salary schedules for yearly-paid maintenance and operating workers range from $3,330 for laborers to $5,112 for metal trades workers. TVA said the boosts average 4.6%.

Aubrey J. Wagner, general manager of TVA, said the new rates reflect rates which prevail in the vicinity among private employers, as required by the TVA Act.

TVA gave this breakdown for the various construction crafts:

	Rate—Per Hour	
	Old	New
Bricklayers	$3.15	$3.275
Boilermakers	2.975	3.10
Carpenters	2.55	2.70
Electricians	3.00	3.10
Laborers	1.425	1.525
Iron Workers	2.85	2.975
Lathers	2.70	2.80
Plasterers	2.875	2.975
Sheetmetal Workers	2.725	2.90
Machinists	2.65	2.775
Operating Engineers	2.85	2.95
Painters	2.575	2.70
Roofers	2.125	2.20
Plumbers and Steamfitters	3.00	3.10
Teamsters	2.025	2.125

LABOR BRIEFS

Some 180 employees of the Snohomish County PUD, Everett, Wash., have remained off their jobs, after attending a "stop-work" meeting on Jan. 6. Only supervisory employees remain on duty. International Brotherhood of Electrical Workers has refused to submit the wage dispute to arbitration, after rejecting PUD's offer of a 10¢ an hour wage increase, said a PUD spokesman. Union asks for 20¢.

Did YOU ever close a cutout against a fault?

When a distribution cutout blows, the blast of flame and "shrapnel" is a hazard to anyone near the line of fire. It is even more dangerous when an operator closes in on a heavy fault with a cutout that is inadequate—that fails and perhaps explodes.

No longer are these necessary hazards for the men who work on electric utility lines. They are not "calculated risks" to which linemen need be subjected.

Because today distribution lines (4.8 Kv and below) can be protected with the S&C Positect—a cutout so safe that most linemen close it by hand. The Positect is safe from explosion because:

1. *INTERRUPTING CAPACITY* is high enough to meet every fault condition on a typical feeder—yet available at "normal duty" prices.
2. *DESIGNED AND TESTED* for closing against a fault—"make" as well as "break."
3. *INTERRUPTING RATINGS* apply to closing in on a fault—not just clearing it.

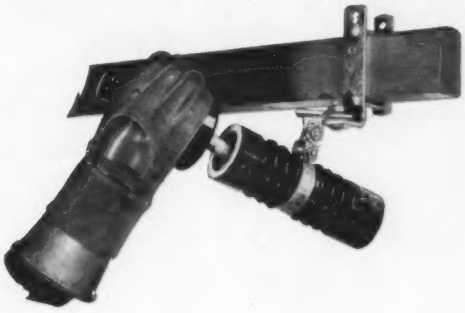
The Positect is safe when it blows because:

4. *BLAST DIRECTED AWAY* from the operator, so he is out of reach of the arc, flame, and "shrapnel" in case he closes in on a fault.
5. *KICKBACK PREVENTED* by high inertia of the fuse tube as it is driven home, directly opposing the recoil forces.
6. *BLAST MINIMIZED* by arc shortening and freer venting.

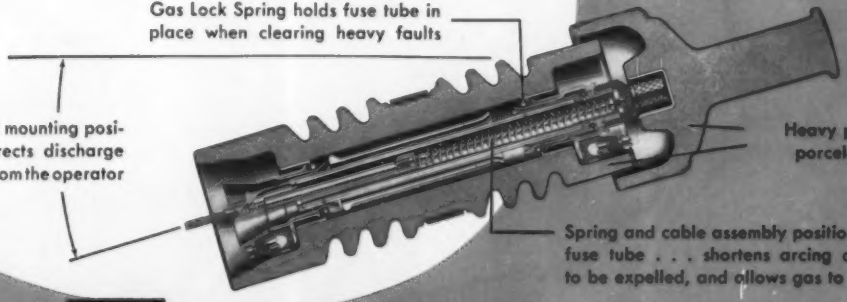
Other safety elements include (1) minimum exposure to live parts; (2) no dangling fuse link pigtail; and (3) ability of the Positect to perform load switching duties.

Detailed information on S&C Positects is contained in Catalog Section 520, available on request.

The Positect (below) is so SAFE that no hook stick is needed . . . it is ordinarily closed by hand



Sectional diagram of the S&C Positect shows how Safety is built in


Gas Lock Spring holds fuse tube in place when clearing heavy faults
Normal mounting position directs discharge away from the operator
Heavy porcelain handle and heavy porcelain housing oppose recoil
Spring and cable assembly positions fuse link in lower end of fuse tube . . . shortens arcing distance, eliminates pigtail to be expelled, and allows gas to be discharged more freely

Specialists in High-Voltage Circuit Interruption since 1910

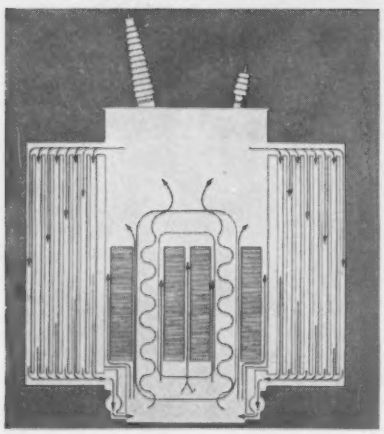
S&C ELECTRIC COMPANY

4421 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U. S. A.

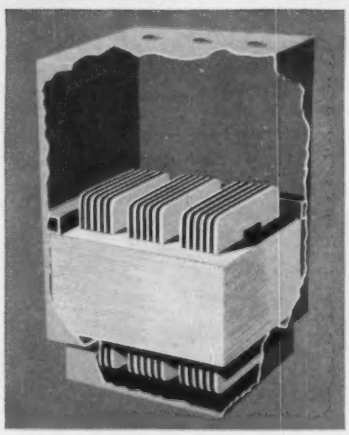
In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario

POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

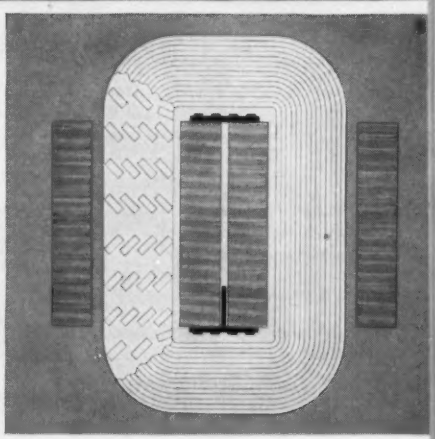
World's largest—400,000-kva, 330-kv, Westinghouse Form-Fit auto transformer in operation at Indiana & Michigan Electric Company's Tanners Creek plant, Lawrenceburg, Indiana.



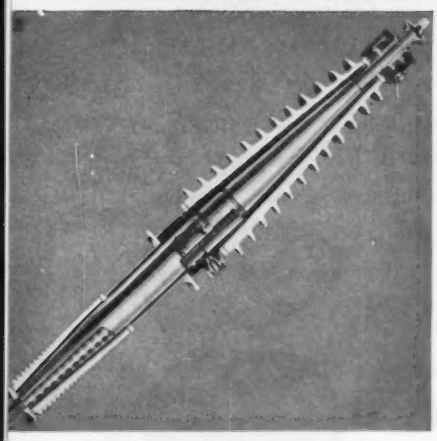
High Thermal Capacity—Forced-oil cooling improves performance of heat transfer system . . . prolongs transformer life by reducing hot spot temperatures, boosts capacity by as much as 67% and results in smaller, lighter weight transformers.



Space, Weight Saver—Close-fitting, rugged tank withstands rough handling; provides compact, low-weight unit which can be shipped upright. Design also reduces weight and maintenance of coolant oil normally required in greater quantities in other types of construction.



Improved Performance—Shell-form design puts core iron on the outside, coils on the inside. Natural vertical cooling arrangement improves thermal characteristics; creepage surfaces are eliminated; voltage oscillations are reduced for improved dielectric characteristics.



Proved Dependability—More than 200,000 Westinghouse condenser bushings have been in operation for a total of a million bushing years with a 99.98% perfect service record. Result: greater protection and more dependable service continuity for your system.

At Record Breaking Capacities...

Here's How Westinghouse Brings You Long-Term Economy in Power Transformers

Westinghouse engineering brings you long-term economy in power transformers by constantly increasing capacity while making practical reductions in size and weight. These improvements have been effected through development of better materials and a more efficient design arrangement.

Strong evidence of success in this effort is the Westinghouse line of "Form-Fit" power transformers which are smaller and lighter per kva than any other design.

These transformers use steel cores made of Hipersil®, a cold-rolled silicon steel which has superior magnetic properties—very high permeability and very low losses. In the Westinghouse shell-form design, the core surrounds, supports and protects the coils, giving them added mechanical strength.

To provide utmost reliability, Westinghouse now impulse tests all power transformers, rated over 10,000 kva and 69 kv, right on the production line. This exclusive quality-control measure assures you that transformers delivered will be free of defects and capable of giving continuous service.

Westinghouse leadership in design engineering is your assurance of superior power transformer performance. Get in touch with your Westinghouse sales engineer, or write Westinghouse Electric Corp., 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-70755

YOU CAN BE SURE...IF IT'S

Westinghouse

the slow speed of the Sangamo J2 watthour meter adds years to its life

SLOW SPEED . . . that's one difference between the Sangamo J2 and other watthour meters. The disk of the J2 makes fewer revolutions to measure the same load.

What the J2's fewer revolutions mean in terms of one year's time . . .

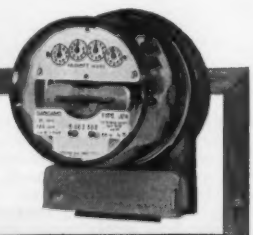
The disk of the J2 revolves 166⅔ times to measure one kilowatt hour. Other meters make 277.7 revolutions to measure a kilowatt hour.

This year's average residential load will be approximately 3000 kilowatt hours. If you multiply this figure by 277.7, you get 833,100 —the number of revolutions a 3.6 constant meter makes in measuring 3000 kilowatt hours.

When we multiply 3000 kilowatt hours by 166⅔, the speed of the J2, we get 500,000. The difference between 500,000 and 833,100 is 333,100. In other words, the J2 makes 333,100 *fewer* revolutions in a year's time to measure the same load! 333,100 *fewer* revolutions to cause wear on moving parts. Think what it would add up to in 30 years!

That's why we say "the slow speed of the Sangamo J2 adds years to its life."

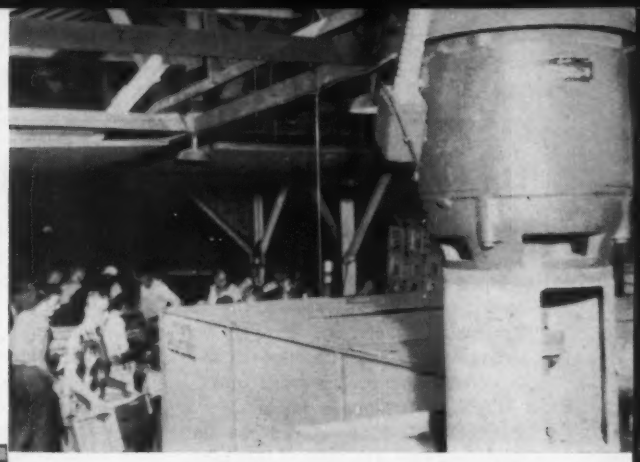
JM56-1



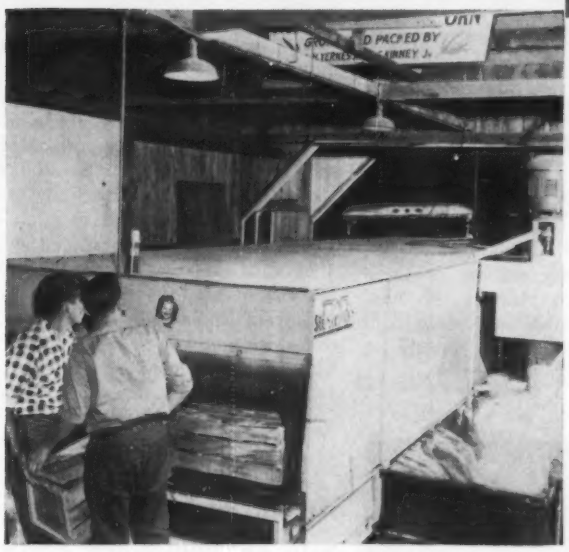
SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS

Icy torrents of rain—electrically-created—keep corn's sugar in and starch out to bring top prices and big sales for Philadelphia food packer



CORN IS PROCESSED at night. After it is crated and passed through cooling tank, trucks rush it to supermarkets in city



WORKERS LOAD CORN onto conveyor belt which takes it through icy bath in tank. Pump in background circulates water

Another Job for Electricity: Cooling Corn

BRUCE FEARN, Philadelphia Electric Co, Doylestown, Pa.

Field fresh sweet corn, grown and packed by Bill Yerkes and Art Kinney for the Philadelphia trade, is just about the best there is. To watch the scramble of local housewives even to buy the culls is a testimonial. One housewife when asked what she did with the culls, replied, "Eat them, of course. Why these culls are better than most corn you can buy in the stores".

When an organization puts on a performance like this it is not just happenstance. Everything that goes into this sweetcorn is an exact science—seed, fertilizer, insect control, picking, handling—every detail gets the personal attention of Art and Bill. The result is "eatin' corn"—and Philadelphians are connoisseurs of "corn on cob" from 'way back.

Wet Cooling for Quality Control

A serious problem in sweet corn production has always been to maintain its quality through to the consumer. The answer today is wet cooling of the corn after picking. It is done by passing the crated corn through a deluge of icy water. The corn goes through the usual selection for size, fullness and uniformity. Then it is packed in standard, wooden slat crates and placed on an "endless" conveyor. The conveyor passes through a long, square tunnel. The roof of the tunnel is actually a perforated, shallow tank. This tank is flooded with icy, 32F water which runs through the perforations creating a torrent of rain. The rain falls on the crates and runs down through the corn. From there the water flows into an accumulator tank filled with 100 lb cakes of ice. There it is picked up by a 7½ hp electric pump and returned to the roof tank, there to cycle on and on through the night.

The why of this has long been known. While the corn is growing on the stalk it has a heavy sugar content—thus the name "sugar (or sweet) corn". But as soon as it is picked the sugar begins to slowly turn to starch. Cooling slows this process down so that many hours after picking the corn still retains its "sweet" taste.

That is why Bill Yerkes and Art Kinney cool their trade marked "None Such" sweet corn with electrically created torrents of icy rain. And that is why Mrs. Philadelphia housewife, when she sees the "None Such" trade mark says, "That's real eatin' corn".

Uniform-Field Gap Used in GE's Oil Test

A new method for measuring the dielectric strength of oil has been developed by General Electric Co. Recognition of the GE method by the American Society for Testing Materials will be recommended as soon as details have been worked out.

GE's High Voltage Laboratory at Pittsfield, Mass., developed the uniform-field gap. The method uses modified hemispheric electrodes, a larger volume of oil in the test cup, and a small agitator to keep the oil in circulation during testing. GE claims the new gap is sensitive to moisture and contaminants dissolved in the oil in parts per million, as well as to suspended particles.

General Electric reports its oil-testing method was developed before the company made its recent recommendation of a two-step reduction in insulation level for high-voltage power transformers (EW, Jan. 16, p 56).

The standard gap has parallel-plate electrodes with edges and corners that GE says are not representative of conditions inside a modern power transformer. Testing with the standard gap gives, according to GE, only gross measurement of oil degradation caused by suspended particles of moisture and other contaminants.

Copper Mill Slated for Vancouver Area

Plans for a $3.5-million copper mill were announced recently by Western Copper Mills, Ltd. Seamless copper tubing and pipe, and busbars for the electrical industry will be produced by the proposed plant in the Vancouver, British Columbia, area.

Construction will start shortly on the 87,000-sq ft structure which will have an 8,100-ton annual capacity. Initial markets will be in Canada and western United States.

McGraw Electric Acquires Furnace and Dryer Firms

McGraw Electric Co concluded negotiations in mid-January for the purchase of the principal assets of W. E. Moore & Co of Pittsburgh and four affiliated Pittsburgh firms.

The acquired company's business consists of the engineering, design and manufacture of steel melting furnaces sold under the name of "Lectromelt Furnaces," and of electric and gas dryers sold as "Lectro-dryers."

The business will be operated as a division of McGraw Electric Co with the present heads of the various departments remaining in charge. W. E. Kerr, vice president of McGraw-Electric Co, and president of its Pennsylvania Transformer Co Division at Canonsburg, will be in general charge.

Chance Models New Side Break Switch

This model side break switch is a scale replica of a new line of switchgear being developed by A. B. Chance Co, Centralia, Mo. The working model is shown being examined by T. E. Curtis (left), chief engineer, and C. A. Liming, sales manager, power switching equipment.

The model will be used to check field reaction to the proposed design and for conference discussions between Chance's design and production engineers. In addition, plans will be made to use the model for sales presentations to point out construction and operation features after the switch is in production.

Attain Remote Switching with Pyramid's L-V Relay

A low-voltage relay with a built-in transformer is available for low-voltage remote control wiring in homes. The unit, known as the Remcon, is a product of Pyramid Instrument Corp, Lynbrook, N. Y.

The relay, which operates the light or appliance, is mounted in an outlet box and controlled by any number of 3-way switches. The silent switches are on 6-v circuits and can be connected by No. 18 bell wire. Simplicity and economy are noted because each Remcon circuit is independent and serves as a self-contained unit.

Hotpoint, Raytheon Make Microwave Cooking Ovens

Hotpoint Co, Chicago, Ill., has designed and will produce and market microwave cooking ovens for home use. The Hotpoint unit is reported to cook foods in minutes.

Raytheon Manufacturing Co, Wal-

(*Continued on page* 59)

ADVERTISEMENT

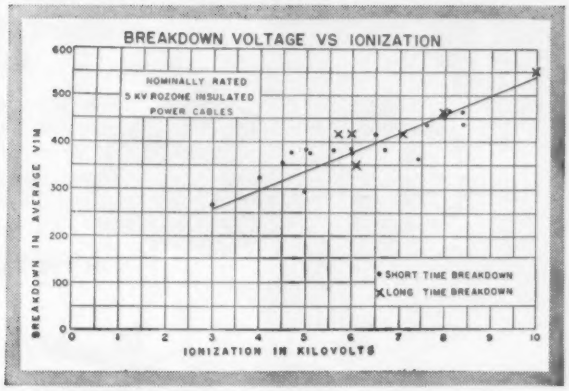


Chart of observed data on breakdown voltage vs. ionization as determined on samples of a rated 5 kv rubber-compound-insulated conductor.

CURRENT TRENDS

No. 2 in a series of articles

Production testing of Corona Level on High-Voltage Cable

Nondestructive testing of cable* is a quality control measure which protects the ultimate user

Whether insulated with rubber or thermoplastic, high-voltage cable must be free of voids and porosity. Otherwise, there may be trouble, if the operating voltage exceeds the corona-forming voltage.

Our job was to provide a test which would insure cable performance in a corona-free condition.

Rome developed and has continuously used a corona-ionization production test procedure since 1947. It is now applied as part of standard testing for all power cable rated 4001 volts and over.

How it's done

The detector is a basic "filter"-type circuit. It consists of an ionization-free, high-voltage transformer with amplifier and detector circuits located in a central control area with other inspection instruments. A corona-free bus-distribution system provides accessible electrical connections to the reels of cable in the test zone.

While bridge circuits have been used for ionization detection, the filter circuit provides more advantages since it involves simpler equipment, it provides for grounded test specimens, is more sensitive, and it can record minimum values of corona level rather than the average value detected by bridge methods.

This test, used on the production line, helps determine the electrical soundness of every foot of cable in every reel. If troublesome voids exist, the detector immediately indicates their presence. If the trouble cannot be remedied, the defective portion of the cable is discarded.

Where trouble occurs

Voids may occur next to the conductor, within the insulation, or beneath the outer shield. Voids are more likely to be found between the insulation and the conductor—and this is the most vulnerable place since it is the area of maximum voltage stress. Proper cable design and correct manufacture are the best assurances for a corona-free cable.

More about testing

The corona-level tests we have been conducting for the past eight years, on all high-voltage rubber- and thermoplastic-insulated power cables consist of measuring the corona level on full reel lengths of cable. This is done before the routine voltage and insulation resistance tests, during which unshielded cables are immersed in water which acts as the ground electrode. Shielded or lead-sheathed cables are tested dry on the floor.

Quality control

As a standard quality control measure, we require that the measured corona level on any high-voltage cable *exceed* the *intended operating voltages* by a predetermined value. This means that the cable should be free of any destructive ionization effects in service. And that's important, because ionization of air in voids between conductor and insulation causes the formation of small quantities of ozone and oxides of nitrogen together with a subsequent reduction in dielectric strength and a rapid physical deterioration of the insulation. With nonozone-resistant rubber insulations you may get corona cutting (similar to sunlight checking).

Testing helps prevent all these possible performance hazards.

The value to you

The real end value of Rome's corona-level testing is its contribution toward production of power cable that assures *you* years of trouble-free service. It is a quality control measure (now getting general industry acceptance) of enormous value to all users of high-voltage cable.

When you buy cable that has been corona-level tested, you derive a certain peace of mind from the knowledge that at least one frequent cause of costly, troublesome service outages has been virtually eliminated. Your maintenance costs go down proportionately. And, indirectly at least, the good will of the people who depend on the power distributed over these lines is enhanced.

If you'd like to know more about Rome Power and Control Cables, a note to us will bring you catalogs, specifications or engineering help.

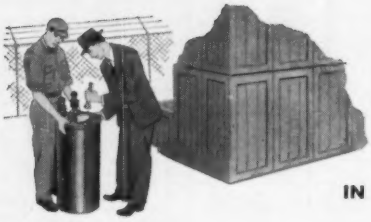
*"The Measurement and Investigation of Ionization Level of Rubber-Insulated Cables," R. C. Graham, E. K. Duffy, W. P. Foster; Trans. AIEE Technical Paper 48-198; August 24 to 27, 1948.

"Corona-Level Testing of Cables," R. C. Graham; reprinted from Electric Light and Power, May, 1953.

"Corona-Level Measurements as Applied to Rubber and Thermoplastic Insulated Cable," R. C. Graham; program Twenty-Second Annual Conference of Doble Clients; January 24 to 28, 1955.

ROME CABLE CORPORATION, Rome, New York

The Big News for '56

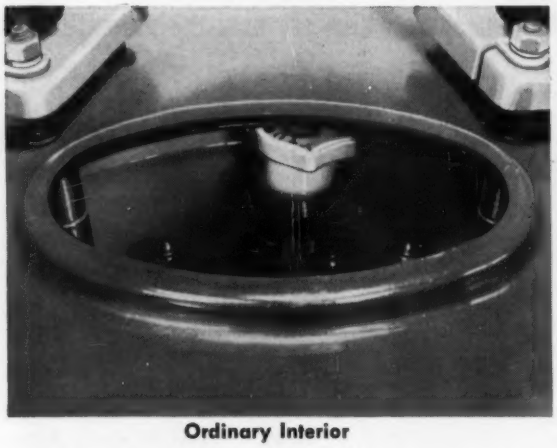


IN THE YARD

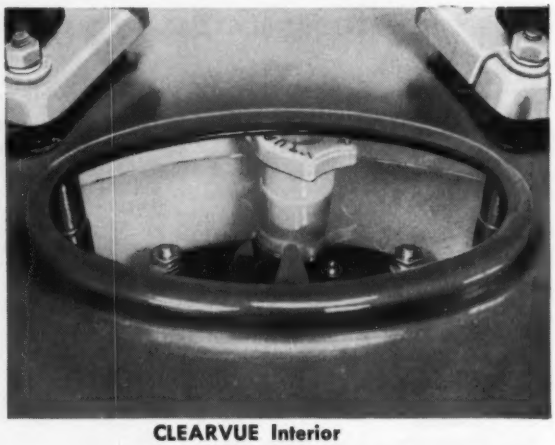
ON THE POLE

Quick, Sure Inspections

MADE EASY WITH EXCLUSIVE KUHLMAN Clearvue INTERIORS



Ordinary Interior



CLEARVUE Interior

You can simplify and speed accurate transformer inspection—in the yard or on the pole—with the exclusive **KUHLMAN CLEARVUE** Interiors.

The value of **CLEARVUE** interiors is dramatically illustrated in the photographs above. Ordinary interiors are difficult to work in, even under good light conditions. With the gleaming **KUHLMAN CLEARVUE** interiors, even the immersed transformer components are sharply visible. This clear view insures correct, fast changes of taps or leads in either bright sunlight or flashlight.

Introduced less than a year ago, **KUHLMAN CLEARVUE** transformers are being specified by increasing numbers of progressive utility operators. They realize that time can be saved and inspections improved when **KUHLMAN CLEARVUE** transformers are used. Make the **CLEARVUE** comparison yourself . . . or let your **KUHLMAN** representative demonstrate the improvement that it makes. And, when you're buying, remember that **ONLY KUHLMAN** distribution transformers have the proven **CLEARVUE** interiors.

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Hotpoint, Raytheon

(*Continued from page* 56)

tham, Mass., will supply technical assistance and electronic components. Microwave power for cooking will be generated by a magnetron, a tube used in radar systems. Raytheon introduced its Radarange oven for commercial use two years ago.

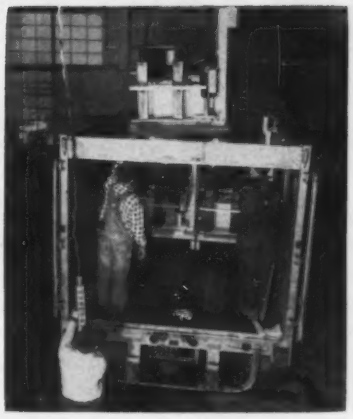
NAED Announces Personnel Appointments

National Association of Electrical Distributors, New York, N. Y., through Arthur W. Hooper, executive director, has announced the following personnel changes and appointments.

William Mumpower, formerly assistant to the executive secretary, is promoted to the newly created position of Secretary-Committee Activities.

Thomas F. Preston, public relations manager, is promoted to the newly created position of Secretary-Field Activities. He will continue to supervise the public relations department for the association and act as its manager.

Donald E. O'Shea has become associated with NAED's public relations department. He was formerly on the editorial staff of Engineering News-Record.



First 50-Kvar Capacitors Shipped by Line Material

Shipments of the first 50-kvar capacitor equipments started recently at Line Material Co's Central Plant, South Milwaukee, Wis. These equipments are destined for installation on the lines of a midwestern utility. They consist of multi-row, pole-mounted racks of switched 50-kvar capacitors.

According to N. K. Delaney, L-M product manager, 450-kvar racks are being used for both 450-kvar and 300-kvar banks. The utility chose to use the larger racks for the 300-kvar banks because it could achieve, readily and economically, a 50% increase in bank size as kilovar demand increased.

Ten Firms Receive Award for Excellent Management

Ten companies prominent in the electrical equipment manufacturing field have been certified as "Excellently Managed" by the American Institute of Management, Inc, New York, N. Y.

The firms named are: Electric Storage Battery Co,* General Dynamics Corp, General Electric Co,* McGraw Electric Co,* Motorola Inc, Okonite Co, Radio Corp of America, Square D Co,* Sylvania Electric Products Inc,* and Westinghouse Electric Corp.*

These companies are among the 408 American and Canadian firms cited by the Institute for 1955. The six companies indicated by an asterisk (*) have received the award for the sixth consecutive year. General Dynamics Corp and Radio Corp of America received the award for the fifth consecutive year.

The awards were announced by Jackson Martindell, president of the Institute. Martindell said their purpose is to "bring deserved recognition to those companies whose managements are doing most to increase productivity, with accompanying benefits to employees, shareholders, their community neighbors, and to the economy as a whole."

M&M BRIEFS

Allis-Chalmers Mfg Co has relocated its Chicago general purpose equipment sales office and warehouse to 3254 North Kilbourn Ave in Chicago. In the 24,000-sq ft, company-owned building will be warehouse space for distribution and instrument transformers, motors, controls, pumps and Texrope drive equipment.

Line Material Co has opened a new office and warehouse at 980 South Sixth West St, Salt Lake City, Utah. E. T. Hall, field engineer, will be located at the new facility. Office and warehouse activities will be handled by J. E. Lieubray, branch supervisor.

Sylvania Electric Products Inc is building a 76,000-sq ft warehouse and sales office in Atlanta, Ga. Completion is scheduled for March. David H. Lambeth will serve as district service manager on all Sylvania products in the new quarters.

Republic Flow Meters Co, Chicago, Ill., has purchased the power plant equipment division of Swartwout Co. Amount involved in the transaction was not disclosed. Republic is establishing a Swartwout Division to carry on engineering, manufacturing, sales, and service of Swartwout's steam specialties. The changeover is expected to be completed by March 1.

Polymer Processes, Inc, has adopted a new method of coating metals, ceramics, glass and wood with various types of plastic materials. The Reading, Pa., firm stated that the process combines natural advantages of the plastics with those of the parent materials to be coated.

Reynolds Metals Co has had its nationwide, private-wire telegraph system doubled in capacity by Western Union. Installed in December, 1953, the system now provides communication between 59 Reynolds plants and offices in 47 cities. Circuits serving 14 cities have been doubled in capacity by duplexing, to permit two-way simultaneous operation.

Sprague Electric Co, North Adams, Mass., expects to start production about middle of 1956 on a surface-barrier transistor, under license by Philco Corp.

Hunter Manufacturing Co, Emilie, Pa., has acquired the outstanding stock of Bristol Engineering Corp, Bristol, Pa. The latter will be a subsidiary of Hunter, producer of aluminum thermal insulation.

BUSINESS OUTLOOK

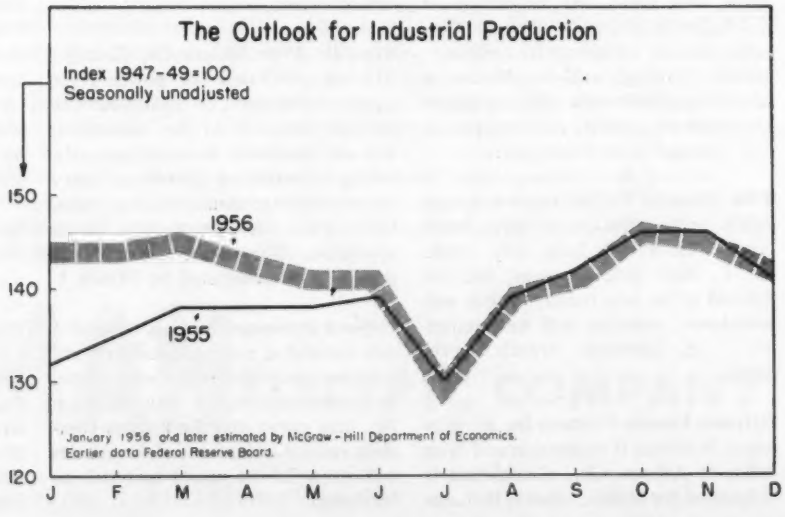
Electrical World

JANUARY 30, 1956

Washington will hold to its wait-and-see attitude until it's quite clear that downturn in the business indicators isn't just seasonal. **The upturn in federal spending in the new budget won't have much impact in 1956.** Farm spending might be up by $250 million, and military and other spending by $750 million—one billion dollars in all. Rise in receipts will likely more than offset this. **Net, this budget is mildly disinflatonary,** especially if collection of social security contributions is taken into account—as in the so called "cash budget." **So far, the Administration is not thinking of tax cuts as an economic stimulus: fails to see the need.** Even if thinking changed, recommended cuts would be small, and election year cross currents would make the outcome uncertain.

This gives the big play to credit policy. Here, two important things have just happened. First, the Federal Reserve appears to have deliberately decided **against** a further rise in the discount rate. This looks like the end of the credit tightening operation which went on throughout 1955. Second, the VA and FHA have just announced a **return to a 30-year repayment period** for mortgages they guarantee. This is the first actual move to **ease** credit in quite a time.

How much this will stimulate housing no one can say. It will lower carrying charges to be sure. But the higher down payments imposed last July are still in effect, and you may need general credit liberalization to take the pinch off housing. **Some thoughtful observers even question whether easy housing credit will really help very much.** They point out that new housing starts declined pretty steadily throughout most of 1955—from 1.5 to 1.2 million, at an annual rate, seasonally adjusted. They note that home building costs are about two and a half times the prewar level, compared to a mere doubling of industrial prices generally. And they wonder whether housing hasn't become a bit overinflated and vulnerable to an old-fashioned real estate cycle. This is the year that could give the answer!



Type No. 301
Triangular Structure*

LIST OF MATERIALS

Quantity	Description
1	Crossarm
1 pr.	Wood crossarm brace
3	Pin-type insulator
1	Ridge iron, single
1	Crossarm pin, short shank
2	Crossarm pin, long shank w/saddle
2	Flanged washer 3" sq. x 3/16", ¾" tap
4	Machine bolt ⅝"
2	Curved washer 2½" sq. x 3/16", 11/16" hole
1	Spring washer
3	MF locknut ⅝"

A Supply Service Geared to your needs

From the top of the pole to the bottom of the hole, Graybar offers you efficient flexible procurement of *all* the electrical supplies and equipment you need for pole-line construction or maintenance.

For one unit . . . or a thousand, the complete list of materials for the structure at left can be ordered together — from your nearby Graybar office or warehouse. For many structure types, we can also supply completely prebored and prefitted crossarm and hardware assemblies. Discuss your needs with a Graybar Outside Construction Specialist — he's experienced at gearing our service to utility needs. His friendly understanding of your problems is the result of Graybar's years of association with the utility industry.

Make it a point to call Graybar *first* — you can be sure your needs will be understood and accurately met. *Graybar Electric Company, Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.* 407-91

CALL GRAYBAR FIRST FOR...

GRAYBAR Everything Electrical

IN OVER 100 PRINCIPAL CITIES

IN THE INDUSTRY

How the Dailies Played the Strike

Westinghouse walkout spurred 'letters to the editor' from wives, strikers and non-strikers. Editorials called for impartial law enforcement and fair play

"Unionism is needed but should not be used as a pistol aimed at the head of management.

"It is better to give a little than try to take all.

"Compromise."

These are the concluding paragraphs in a letter from a striker's wife to the Mansfield (Ohio) News-Journal. Like dozens of other such letters it found its way into the "letters" column of that newspaper. It was pretty much the same in other towns where employees of Westinghouse Electric Corp have been on strike for more than three months.

Union members and their wives found the "letters" columns a handy way to vent their feeling on the course of the strike. Many of the letters made sprightly reading and offered a bit of competition for the editorial writers whose offerings appeared on the same pages.

Want Strong Law Enforcement

Editors in the strike towns generally took a middle-of-the road course in commenting on the strike. More aggressive among the papers was the Pittsburgh Post-Gazette which roundly criticized police for failure to enforce injunctions limiting picketing and to maintain order at plant entrances.

News stories in plant town newspapers played up the local aspects of the strike, gave slight attention to the bargaining sessions which got most of the attention in the metropolitan papers.

But one New York paper sent its former war correspondent to cover the strike activities at Sharon, Pa. His dispatches compared the situation there to battlefront conditions. He found a lot more excitement than the reporters who filed daily stories on the bargaining sessions.

None of these professional efforts, however, quite matched the human interest and the pathos contained in open letters written by men and women who had a big stake in the course of the strike. These were the strikers, the non-strikers, and their wives. They longed for some break which would restore labor peace.

A typical letter came from a union steward of Local 617 in Sharon. Writing to the editor of the Sharon Herald, he said in part;

Express Loyalty to Company

"I personally wish to tell you and everyone else who is interested that the Westinghouse workers as a whole are a loyal bunch of people to their employer. This is proved by the long service records of the majority of our people. For instance, ten years is the rule in East Pittsburgh. Most of us buy Westinghouse products. . . ."

Letter from another striker took a different slant. After deploring union policy which injects chaos and confusion into industrial relations, this worker went on,

"Somehow, after 16 weeks of unemployment at East Pittsburgh—16 weeks of payless pay days—I disagree with this so-called good union practice. I like pay days with pay, because on those days I can be sure because it's Westinghouse."

The columnist for the liberal New York Post, which usually takes sides on such matters, was hard put to find an issue. In a recent column discussing the plight of workers at the Bloomfield, N. J., lamp plant, the columnist concluded on this note:

"The future for which James Leavy (a 45-year-old worker in the lamp division) strikes is at Westinghouse; there is probably no good job for him anywhere else."

TECHNICAL NOTES

Four 60-lb magnesium anodes can provide complete protection against corrosion for 4,000-ft submarine cable for four years.

Field preheating can damage the collector rings if done at standstill. Even at low speed the end turns heat much faster than the body of the winding.

Visual corona starts on 3-in. diameter spun-brass spheres at 175 kv, on 5-in. at 227 kv, and on 6-in. at 285 kv.

Economically feasible loadings on short (say 10-mi) transmission lines may be up to five times surge impedance; above 50 mi it is doubtful if the factor is more than two.

Decision to permit relays to trip a generator for indications of trouble is easy where cost and delays of extensive repairs on generator or turbine outweigh the distress of possible tripping from incorrect relay operations.

Gas pipe lines have transmission capabilities up to 5 million kw along with intermediate and terminal storage facilities.

Chlorination of condenser cooling water for cleanliness is most effective if chlorine is injected at point for maximum diffusion.

Uranium resources exceed 100,000 tons in each of 20 odd U.S. deposits, some running over 1 million tons.

New Jersey Rules on Depreciation

- **Public Service E&G gets PUC order on handling of tax deferral**
- **Company's proposal that taxes be normalized accepted by PUC**
- **Commission ruled that the restricted surplus method be used**
- **PUC gives tentative approval subject to four conditions**

The New Jersey Board of Public Utility Commissioners, in a letter of Dec. 8, 1955, gave tentative approval to the proposal of Public Service Electric & Gas Co for certain accounting treatment of the tax deferral arising from liberalized depreciation.

PUC Agrees With Company Proposal

The order (which was in the form of a letter addressed to the company) agreed to the company's proposal that taxes be normalized and that the restricted surplus method be used in accounting for the tax deferral.

The order raised a number of interesting, and perhaps controversial, points. It said, in referring to the company's petition, that "the deferral is in the nature of an interest-free loan from the federal government and that it was the intent of Congress to provide by such tax deferral, working capital for the expansion of plant, rather than a reduction of tax expense to be reflected in rates or an increase in dividends."

As to the question of whether the claimed tax deferral is in reality a tax reduction, the order noted: "The staff has informed the board that it is of the opinion that the matter of normalizing the accounting effect of the possible reduction in taxes under Section 167 is not analogous to the heretofore approved accounting treatment applicable to accelerated amortization.

Basis of Liberalized Depreciation to Be Decided

"The staff is likewise of the opinion that until the company has selected the basis of liberalized depreciation which it desires to use and until studies are available which would set forth the actual effect of such method, a final conclusion cannot be reached. The board's staff recommends that a tentative approval of your proposal be granted at this time, subject to conditions appearing later in this letter."

As to the accounting disposition, the board in its order, said:

"(1) The properties subject to depreciation computed under Section 167(b) (2) or (3) of the Internal Revenue Code of 1954 shall be accounted for in the same manner as the properties not so subject, and depreciation shall be accrued on the books without giving effect to depreciation allowances for income tax purposes.

"(2) During the period when the aggregate annual allowances for depreciation for income tax purposes computed under Section 167(b) (2) or (3) of the Internal Revenue Code of 1954 exceed the allowances on the same properties computed on the straight line basis under Section 167(b) (1) of said code, there shall be included under operating revenue deductions, in account 507 Taxes, subaccount 'Provision for Deferred Federal Taxes on Income,' a charge equal to the reduction in federal taxes on income resulting from the increase in depreciation allowances computed under Section 167(b) (2) or (3) over such allowances computed under Section 167(b) (1); the amount so included to be credited to account 271 Earned Surplus, subaccount 'Earned Surplus Restricted for Future Federal Taxes on Income.'

Accounting Procedure Outlined

"(3) During the period when the aggregate annual allowances for depreciation for income tax purposes computed under Section 167(b) (2) or (3) are less than the allowances on the same properties computed under Section 167(b) (1), there shall be included under operating revenue deductions, in account 507 Taxes, subaccount 'Portion of Federal Taxes on Income Deferred in Prior Years,' a credit equal to the increase in federal taxes on income resulting from the excess of depreciation allowances computed under Section 167(b) (1) over such allowances computed under Section 167(b) (2) or (3); the amount so included to be charged to account 271 Earned Surplus, subaccount 'Earned Surplus Restricted for Future Federal Taxes on Income,' until the balance therein is exhausted.

"(4) The company shall incorporate in its annual report to the board, a statement with respect to the effect of Section 167 on its income tax liability, which statement shall include (a) the amount of plant costs affected, (b) the reduction in federal income taxes, (c) the entries made in accordance with this directive, and (d) any other pertinent data or calculations concerning the accumulation or disposition of the account 'Surplus Restricted for Future Federal Taxes on Income' which the board may request.

Tax Reductions to Be Used for Expansion

"This tentative authorization is subject to the following conditions:

"**1.** That any tax reductions resulting from the application of either of the methods set forth in Section 167(b) (2) or (3) of the Internal Revenue Code of 1954, shall be expended for expansion or replacement of plant facilities.

"**2.** That no charges, other than those authorized by this letter and our letter of Jan. 16, 1953, shall be made to the account entitled, 'Surplus Restricted for Future Federal Taxes on Income' except as may be approved by this board.

"3. The company shall submit to the board precise data as soon as available showing the actual effect of the application of Section 167 on its income tax liability for the years 1954 and 1955.

"4. This authorization is confined to accounting procedure only."

FINANCIAL BRIEFS

Fast Write Off Certificates—Office of Defense Mobilization has granted Virginia Electric & Power Co a fast amortization certificate for 60% of its $23.8-million Bremo generating plant, Fluvanna County, Va. Company also got a permit on 60% of $1,039,000 cost of transmission facilities at Staunton, Va. . . . Houston Lighting & Power Co has received a write-off of 35% of $14,390,000 generating facilities . . . Pacific Gas & Electric Co has been granted a 65% writeoff of $8.2 million in generating facilities, and Cleveland Electric Illuminating Co has received 65% of $5,672,00 of transmission facilities.

New York City Controller Lawrence Gerosa likes San Diego Gas & Electric Co and Delaware Power & Light Co bonds in which to invest the city's pension system's moneys.

Higher Common Stock Dividends—Wisconsin Electric Power Co will pay Mar. 1 a quarterly common stock dividend of 40¢ a share as compared with 37½¢ previously. In 1955 company paid a year-end special of 47½¢ . . . Southern Co will pay Mar. 6 a quarterly common stock dividend of 25¢ a share versus 22½¢ previously.

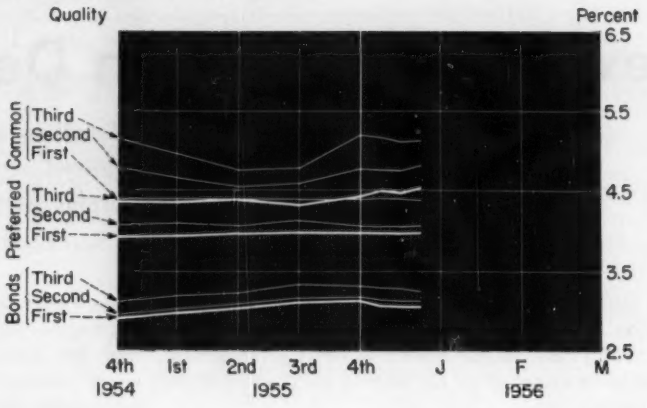
Kimball, W. Va., Light & Water Co has asked the Public Service Commission of West Virginia to buy both electric and water systems operated by Landgraff Realty Co, Inc, at Landgraff in Brown's Creek District.

A comparative study of the "Interest During Construction" credit per share of common stock for 86 electric utility companies has been prepared by Goodbody & Co. For copy write: Ted Locke, Public Utility Research Specialist, Goodbody & Co, 115 Broadway, New York 6.

Arizona Public Service Co has purchased "a large scale Univac electronic data processing system" from Remington Rand, a division of Sperry Rand Corp, it was announced by Walter T. Lucking, utility president.

Safe Harbor Water Power Corp, chartered under Pennsylvania laws, has certified to the Secretary of State in New York that it will do business at 90 Broad St., New York.

Today's Utility Yields (%)



QUALITY	BONDS			PREFERRED STOCKS			COMMON STOCKS		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Jan. 19	3.06	3.12	3.23	3.99	4.09	4.38	4.52	4.81	5.12
Jan. 12	3.07	3.12	3.26	3.98	4.08	4.39	4.49	4.75	5.11

Utility Earnings

COMPANY	PERIOD MONTHS	ENDED	NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Carolina Power & Light	12	Dec.*	$9,368,985	$7,846,241	$1.70(a)	$1.63(a)
Pacific Power & Light	12	Nov.	6,661,034	5,629,683	1.77(b)	1.47(b)
San Diego Gas & Electric	12	Nov.	5,557,104	5,320,049	1.16(c)	1.31(c)

Notes—*Subject to year-end audit; (a) Based on 4,600,000 shares in 1955 and 4,095,000 shares in 1954; (b) After provision for deferred taxes; and (c) Based on average number of shares.

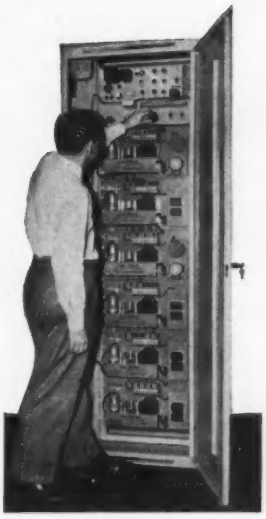
Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
SCHEDULE FOR JANUARY—FEBRUARY—MARCH			
BONDS			BID DATE
Central Power & Light—1st mtg due 1986	$10,000	.....	Feb. 14
Dallas Power & Light—1st mtg due 1986	10,000	.....	Feb. 15
Kansas Gas & Electric—1st mtg due 1986	7,000	.....	Feb. 27
Texas Electric Service—1st mtg due 1986	10,000	.....	Feb. 28
Mississippi Power—1st mtg due 1986	4,000	.....	Mar. 1
Houston Lighting & Power—1st mtg	30,000	.....	Mar. 7
Alabama Power—1st mtg due 1986	14,000	.....	Mar. 15
Georgia Power—1st mtg due 1986	16,000	.....	Mar. 29
PREFERRED STOCK			
Southern California Edison—1,200,000 sh	$.....	.....	Feb. 14*
Northern States Power—100,000 sh	10,000	.....	Feb. 29
Mississippi Power—40,000 sh	4,000	.....	Mar. 1
COMMON STOCK			
Texas Utilities—400,000 sh	.....	.....	Jan. 31
Atlantic City Electric—75,000 sh	.....	.....	Feb. 1
Southern Indiana Gas & Electric—83,030 sh (to be offered commonholders on 1-for-11 basis, record Feb. 21 to expire Mar. 8, with no oversubscription privileges)	.....	.....	.....
Kansas Gas & Electric—200,000 sh	.....	.....	Feb. 27
Northern States Power—670,920 sh (to be offered commonholders on 1-for-20 basis, record about Mar. 1)	.....	.....	.....

Notes—*Probable date of offering by First Boston Corp.—Dean Witter Co, underwriters.

CONTROL CONSOLES *are custom engineered by Honeywell for the system or station. Operators can choose flat frequency, flat tie line, or tie line bias control . . . can set up automatically maintained incremental loading schedules.*

HIGH-SPEED TELEMETERING *operates over carrier, wire, or micro-wave channels. Vital information is displayed on easily-read instruments on the dispatcher's panel.*



CONTROL SERVOS *use true feedback techniques for high stability. Speed of response is readily matched to generating system characteristics.*

NEW
electronic control for system load and frequency

HERE'S the fast, accurate, all-electronic way to regulate network interchange . . . system load dispatching . . . generation of individual units in stations. Engineered and built by Honeywell, this new type of control uses highly stable, dependable servo circuits.

It includes continuous, high-speed telemetering using distortion-proof pulse rate transmission. A single channel is usually all that is needed for all control signals for each station. Area and net power totalizing is done rapidly and accurately by electronic circuits.

Control is designed to provide maximum economy of system operation and accurately maintain schedules. "Building block" design simplifies the initial installation . . . makes expansion easy. Ask your local Honeywell sales engineer to discuss your system's requirements . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—In Canada, Toronto 17, Ontario.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

STATISTICS

U. S. Population Shows a Steady Climb

1950	Total Population	Increase Over Previous 12 Months	1953	Total Population	Increase Over Previous 12 Months
Jan. 1	150,552,000	.....	Jan. 1	158,434,000	2,644,000
July 1	151,683,000	.....	July 1	159,643,000	2,615,000
1951			1954		
Jan. 1	153,072,000	2,520,000	Jan. 1	161,107,000	2,673,000
July 1	154,360,000	2,677,000	July 1	162,409,000	2,766,000
1952			1955		
Jan. 1	155,790,000	2,718,000	Jan. 1	163,930,000	2,823,000
July 1	157,028,000	2,668,000	July 1	165,248,000	2,839,000
			Dec. 1*	166,512,000	2,813,000

*As of Dec. 1, 1955, population had jumped 10.6% over Jan. 1, 1950.

Source: U. S. Department of Commerce, Bureau of Census

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Nov.	113.55	112.13	101.11	12.3
Peak—Class I Systems	Nov.	96.4	90.6	82.0	17.6
Estimated Dec. '55 Peak	Oct.	96.72	96.82	96.21	0.5
Estimated Dec. '56 Peak	Oct.	104.34	104.31	102.85	1.4
(million kw ...)					
Production—billion kwhr	Nov.	47.76	47.37	40.21	18.8
Hydro		9.21	8.77	8.11	13.6
Fuel		38.54	38.60	32.10	20.1
Sales—billion kwhr	Oct.	43.16	43.51	36.18	19.3
Residential		10.33	10.58	9.36	10.4
Commercial		6.87	7.36	6.32	8.7
Industrial		23.45	22.84	18.14	29.3
Other		2.51	2.72	2.36	6.4
Fuel Consumption	Nov.				
Coal—million tons		13.29	12.70	10.70	24.2
Oil—million barrels		7.10	6.04	5.82	22.0
Gas—billion cu ft		82.26	104.75	88.40	−6.9
Net Income Class A & B Co's—$ million	Oct.	95.67	100.23	86.80	10.2
Residential Customers—millions	12 mos.	44.21	44.10	42.94	3.0
Revenue per kwhr	ended	2.65¢	2.66¢	2.70¢	−1.9
Avg kwhr per customer	Oct. 31	2,715	2,698	2,513	8.0
Avg annual bill		$71.95	$71.77	$67.85	6.0

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Dec.	141	146	128	10.2
ENR Construction Cost	Dec.	141.1	141.1	134.7	4.8
BLS Cost-of-living	Nov.	115.0	114.9	114.6	0.3
NEMA Sales	Nov.				
Insulation materials		155	156	124	25.0
Electric appliances		106	118	90	17.8
Household refrigerators		65	64	47	38.3
Wholesale prices	Dec.				
Motors and generators		127.2	127	121.8	4.4
Transformers and regulators		129.2	129.2	128.1	0.9
Switchgear and fuses		145.9	145.9	135.3	7.8
GNP—annual rate—$ billion	3rd Qtr.	392.0	384.8	358.8	9.3

THERE'S A STOREHOUSE OF KNOWLEDGE AT MOLONEY

knowledge gleaned from 60 years of experience in manufacturing transformers . . .

knowledge gained from research . . .

knowledge gained from experience by Moloney's engineers . . .

knowledge that helps Moloney design and fabricate dependable transformers . . .

knowledge that means dependability in service and performance . . .

knowledge that benefits you and your utility system.

ME55-39

MOLONEY ELECTRIC COMPANY

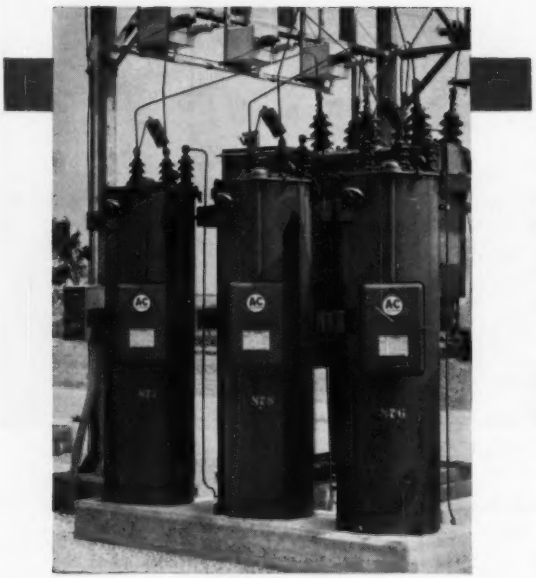
Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONT., CANADA

One operator writes this about Allis-Chalmers field help:

"When A-C people work on a regulator, they show up *with* the parts they might need, open the regulator once, service it, and it goes back on the line without delay."

ALLIS-CHALMERS
Originators of
5/8% Step
Voltage Regulators



FOR EITHER substation or feeder regulation, A-C distribution regulators meet system needs.

There's plenty of reason for praise like this. Allis-Chalmers voltage regulators are designed for fast, convenient servicing. A-C engineers understand the need for continuous operation and provide for it in their regulator's design.

Allis-Chalmers field service helps you get the most profit from your regulator operation. Field stocks of needed parts are available for fastest possible delivery. Factory service includes help in getting parts to you fast, plus engineering assistance whenever and wherever you need it.

Find out for yourself. Ask about Allis-Chalmers regulator service. Call the A-C office nearest you or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

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